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The Impact of Prospective Payment on Medicare Service Use and Reimbursement During the First Demonstration Year

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EXECUTIVE SUMMARY

As part of its ongoing effort to study methods of providing more cost-effective care, the Health Care Financing Administration (HCFA) has recently implemented the Per-Episode Home Health Prospective Payment Demonstration. Under the demonstration, participating home health agencies receive a fixed, lump-sum payment for the first 120 days of each episode of care provided to Medicare beneficiaries and a predetermined rate for each visit thereafter. This method of compensation differs substantially from the current method of Medicare reimbursement for home health services, under which agencies are reimbursed for actual costs incurred, up to a specific limit. By allowing agencies to retain most of any surplus payments over cost, prospective payment gives agencies a financial incentive to provide home health care in a more cost-efficient manner than under traditional cost-based reimbursement.

Ninety-one agencies in five states entered the three-year demonstration at the start of their 1996 fiscal years. Prior to the start of the demonstration, the participating agencies were randomly assigned to either the treatment group (which is paid under the demonstration's prospective payment method) or a control group (which continues to be paid under Medicare's normal method of cost-based reimbursement). The payments treatment group agencies receive for the first 120 days of a patient episode are based on each agency's own costs in the fiscal year immediately preceding its entry into the demonstration, adjusted at the end of each year for changes in its case mix. While each agency is "at risk" during the first 120 days after admission for all home health visits the agency provides, HCFA reimburses treatment agencies for up to 99 percent of fiscal-year losses up to the Section 223 payment limits.[1] Profits in excess of specified limits must be shared with HCFA.

RESEARCH QUESTIONS AND METHODOLOGY

In this report we examine data from (roughly) the first year of the demonstration to test hypotheses about the possible effects of prospective payment on the use of Medicare-covered services by agency patients and on reimbursement for those services. Given the limited data currently available, this preliminary report focuses only on services taking place during the "risk" period (that is, the first 120 days) of a home health episode. As more data become available, final evaluation reports will examine demonstration effects during the months following the risk period and during the second demonstration year. For this report we tested hypotheses concerning the impacts of the demonstration on the use of and reimbursement for Medicare services by type: inpatient hospital, skilled nursing facility (SNF), hospice, nondemonstration home health, outpatient hospital, physician and other practitioner, durable medical equipment, and other Part B services. (The impacts of the demonstration on the use of home health services delivered by demonstration agencies and on the cost of delivering those services are the subjects of other preliminary evaluation reports.)

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[1]The Section 223 payment limits are cost-per-visit payment limits that apply to all agencies in the Medicare program.

The analysis presented in this report is based on approximately 51,000 home health episodes taking place in 87 of the demonstration agencies (4 of the 91 agencies were excluded because they dropped out of the demonstration). All admissions occurring between an agency's demonstration start date and August 1996 are included. Medicare claims files provided data on the outcome variables describing the use of and reimbursement for services during the risk period. Data collected at admission for case-mix adjustment and from earlier Medicare claims provided measures of preadmission characteristics of patients admitted to demonstration agencies. Data on agency characteristics were obtained from the agency cost reports and the demonstration implementation contractor.

Ordinary least squares models and logit models were used to estimate program effects, controlling for preexisting differences between treatment and control agencies in patient and agency characteristics. This approach proved crucial to obtaining valid impact estimates since, despite the randomization of participating agencies, there were several significant differences between treatment and control agencies aside from the method of payment. Observations were weighted so that each agency was represented equally in the analysis. Standard errors of impact estimates were calculated using special software designed to account for the effects of sample clustering and weighting, so as to avoid overstating the precision of the estimates. Analyses of the robustness of our regression estimates showed that they were not sensitive to the weighting scheme or statistical methods used.

FINDINGS

Although preliminary analysis suggests that per-episode payment markedly reduced the number of visits demonstration home health agencies provided during the first 120 days after admission (Cheh et al. 1997), it did not affect the use of or reimbursement for other Medicare-covered services. This absence of an effect on the use of other Medicare-covered services suggests that a reduction in home health use at the level observed under the demonstration does not adversely affect care quality or shift costs to services in other settings. The following illustrates the lack of effect the demonstration had on the use of different types of Medicare services during the risk period.

Numbers per Patient During the 120-Day Risk Period	Control Group Mean	Treatment/Control Difference	P-value
Inpatient Admissions	0.48	0.00	0.99
Emergency Room Encounters	0.54	-0.01	0.63
Days in Skilled Nursing Facility	2.4	-0.0	0.99
Visits from Nondemonstration Home Health Agencies	3.3	0.4	0.40
Outpatient Hospital Visits	2.5	-0.1	0.50

Inpatient and Emergency Room Services

A key concern about the implementation of per-episode payment was that the quality of home health care might suffer as a result of financial incentives to reduce the number of visits provided or the cost of providing visits. The most serious adverse effects on quality would be reflected in increases in hospital and emergency room use, but no such increases were observed. Patients of treatment and control group agencies had nearly identical levels of inpatient service and emergency room use during the 120 days following home health admission. Roughly a third of all patients of treatment and control group agencies were admitted to the hospital during the risk period, and about a third went to a hospital emergency room for care.

Skilled Nursing Facility and Hospice Services

Even if per-episode payment did not adversely affect care quality, it might have caused care to be shifted from home health to some other setting, like a nursing home or hospice, particularly if a home health agency viewed a patient as particularly costly to serve. However, we found no evidence that care in SNFs or hospices was substituting for the observed reduction in home health visits. Roughly 10 percent of patients from treatment and control group agencies were admitted to a SNF during the risk period, and under 3 percent entered a hospice.

Nondemonstration Home Health Services

A number of events could lead a patient of a treatment home health agency to receive services from another agency during the 120-day period covered by per-episode payment. Some of these events are not related to the demonstration and thus should be equally likely to occur to patients of control agencies. For example, it sometimes happens that hospital-based home health agencies will provide services to patients requiring home health care following hospitalization, even if the patient had been in the care of another agency before the hospitalization. On the other hand, the earlier discharge of patients by treatment agencies, a clear incentive under per-episode payment, is an event that may lead treatment agency patients to use more nondemonstration home health services than control agency patients. In fact, Cheh et al. (1997) found that treatment agencies discharged patients an average of 10 days sooner than did control agencies. However, earlier discharge (and subsequent use of other home health services) may reflect either better or poorer care from treatment agencies. Early discharge would reflect better care if it resulted from more-efficient patient teaching and better coordination with community services. Nonetheless, patients may become accustomed to receiving home health care and in a highly competitive home health market, may be able to find other home health agencies to provide services--even those no longer strictly necessary. On the other hand, if treatment agencies discharged patients inappropriately early, the use of other home health care would reflect poorer care. All these events--those induced by per-episode payment reflecting better or worse care, as well as those external to the demonstration--are reflected in our measures of home health provided to demonstration patients by nondemonstration agencies.

Treatment/control differences in the receipt of and reimbursement for services from nondemonstration home health agencies were small and generally not statistically significant. Eight

percent of control agency patients received home health services from an agency other than their demonstration agency during the risk period, as compared with nine percent of treatment agency patients. This difference was statistically significant only at the 10 percent level and disappeared when we dropped one large treatment group agency whose patients had a rate of nondemonstration agency service use about four times the average. Furthermore, treatment and control agency patients who did receive services from nondemonstration agencies received roughly similar numbers of visits from such agencies (about 40).

Part B Services and Overall Reimbursement

Per-episode payment also had no effect on the use of Part B services. Nearly two-thirds of patients from treatment and control agencies had an outpatient hospital visit during the risk period, often for lab tests and x-rays. Nearly all (92 percent) saw their physicians (or other practitioners); almost half (46 percent) purchased durable medical equipment; and most (80 percent) used other Part B services.

Because per-episode payment had no effect on the use of Medicare-covered services, it comes as no surprise that it had no effect on Part A, Part B, or total Medicare reimbursement. On average, patients of treatment and control agencies had part A reimbursements (exclusive of demonstration home health) of roughly $4,600 and Part B reimbursement of $2,000 during the 120 days following home health admission, for a total of just under $6,600 (or about $1,650 per month).

We did not estimate differences in *demonstration* home health services in this analysis and thus have not included demonstration home health reimbursement in our totals. We did not estimate differences in the use of demonstration home health services, because they were was the subject of another project report (Cheh et al. 1997). Estimates of the effect of per-episode payment on the *cost* of home health care (that is, the cost to the home health agency of providing care) will be the subject of a future report. Regression-adjusted estimates of the effect of per-episode payment on home health reimbursement--the cost of care to the Medicare program--are not informative, because reimbursement to treatment group agencies was set, by design, at predetermined levels based on agency reimbursement patterns during the year before the agency joined the demonstration. By contrast, control group payment was based on the number of visits provided to current patients. Thus, because the payment mechanisms for patients of treatment and control agencies were not comparable, estimating regression-adjusted impacts on home health reimbursement was not appropriate.

We note, however, that Medicare reimbursement for home health services provided by demonstration agencies during the risk period averaged $3,067 for patients of control group agencies, compared with $3,090 for patients of treatment group agencies. (The unadjusted difference between these two amounts, weighted for agency size, was not statistically significant.) Therefore, total Medicare spending during the 120-day risk period was just over $9,600, or about $2,400 per month.

CONCLUSION

Although per-episode payment appeared to lead to a substantial reduction in the number of home health visits provided by treatment group agencies, we found no evidence that it led to the substitution of care in other settings or adversely affected care quality, as reflected in the use of and reimbursement for other Medicare-covered services. These conclusions held up under the use of alternative weighting schemes and statistical methods for estimating program impacts, underscoring their robustness. Moreover, these conclusions are consistent with those of the evaluation's preliminary analysis of demonstration impacts on care quality, an analysis that examines data from the demonstration's quality assurance contractor and data describing the use of Medicare services for specific home health admitting diagnoses (Chen et al. forthcoming).

This preliminary analysis was restricted to Medicare-covered services during the 120 days following home health admission for episodes that occurred during roughly the first year of the demonstration. Although we observed no effects on service use in this analysis, it is possible that demonstration impacts may arise during the months following the initial 120-day risk period or in later demonstration years (as treatment group agencies gain more experience with prospective payment and potentially reduce visits further or make other changes). Service use in the post-risk period and in later demonstration years will be included in the evaluation's final impact analyses. In addition, while we detected no demonstration effects on the use of services overall, some offsetting effects may have existed for particular subgroups of patients or home health agencies. Thus, we will also estimate demonstration effects on patient and agency subgroups as part of the final impact analysis.

While we are confident in concluding that, in its first year, the demonstration had no effect on Medicare service use and reimbursement during the risk period, caution should be exercised in generalizing these results to home health agencies not participating in the demonstration or to a national program of per-episode payment for Medicare home health care. As in any study in which the participants are volunteers, demonstration agencies may be those best able to respond to the incentives of the demonstration (for example, they may be more concerned than others with the quality of care they deliver or better able to reduce visits without adversely affecting patients). The evaluation's final report will include an analysis of the representativeness of participating agencies.

We also note that the results may not precisely predict how agencies would behave and thus, how their patients would fare under a national program of per-episode payment, because such a program would likely differ from the demonstration. Under a national program, agencies would not be protected from incurring financial losses, which could compel some to respond more aggressively. Furthermore, the per-episode rate paid to an agency would probably not be based on its own prior cost per episode, but on a regional or national average, or it may be set at some percentage of an average, greatly increasing the potential for losses for agencies that tend to provide large numbers of visits per episode or to have high costs. This might cause agencies to reduce visits more than we observed in our preliminary analysis and, in turn, may increase Medicare spending for other services. On the other hand, such pressures may be offset by the commitment of agencies to their patients, by pressure to keep patients and referral sources happy, and by HCFA's quality review process.

Despite these concerns, the findings here strongly suggest that agencies can respond aggressively to a financial incentive to reduce home health visits and episode length without adversely affecting patients during the first 120 days after admission. These findings are encouraging evidence that it may be possible to reduce Medicare home health costs significantly without harming beneficiaries. Later analyses of home health care quality under the demonstration and of beneficiaries' satisfaction with care will provide further evidence on this issue.

I. THE PER-EPISODE HOME HEALTH DEMONSTRATION AND EVALUATION

The Health Care Financing Administration's (HCFA's) Per-Episode Home Health Prospective Payment Demonstration tests the extent to which prospective payment for Medicare home health services increases efficiency in the provision of services. Such efficiency is intended to reduce public expenditures while preserving access to and quality of care. Per-episode payment encourages participating agencies to reduce both the number of visits per episode and the cost per visit. These incentives differ greatly from those found in the current system of cost-based reimbursement, which provides no reward for efficient care delivery.

This report presents the findings of a preliminary analysis of demonstration impacts on the use of and reimbursement for Medicare-covered services. This analysis is important, because it is the goal of prospective payment for home health to reduce not only the cost of the Medicare home health benefit, but overall Medicare spending as well. Furthermore, increases in the use of and payment for Medicare-covered services other than home health care are an indirect indicator of adverse program effects on the quality of home health care.

This chapter provides an overview of the history of the Medicare home health benefit and the Medicare-certified home health industry and continues with a description of the Per-Episode Home Health Prospective Payment Demonstration. The reader who is familiar with Medicare home health may wish to begin with Section B, which describes the demonstration. Section C provides an overview of the research issues and general approach taken to conducting the evaluation. Section D describes the hypothesized effects of per-episode payment on Medicare services such as inpatient hospital services, skilled nursing facility services, and physician services.

A. THE MEDICARE HOME HEALTH BENEFIT

Congress established the Medicare home health care benefit in 1965, when the original Medicare program was created. Home health benefits were included to offer beneficiaries with acute conditions a less intensive and less expensive alternative to inpatient hospital care. At different times since the inception of the Medicare program, the home health benefit has been modified, partly to increase access to care.

Currently, the Medicare home health benefit covers home health services under Parts A and B; neither a deductible nor coinsurance applies. To be eligible for home health benefits, the beneficiary must (1) have Medicare coverage; (2) be homebound; (3) be under the care of a physician; and (4) need skilled nursing, physical therapy, or speech therapy on a part-time or intermittent basis.[1]

HCFA administers the Medicare home health benefit through fiscal intermediaries (FIs), each serving a defined geographic region of the country. In addition to serving as communication links between HCFA and the agencies, FIs also review claims to limit inappropriate use of services, determine reasonable costs, and administer payments to home health agencies.

Outside the prospective payment demonstration, Medicare reimburses agencies for the reasonable costs incurred to provide care. Since July 1987 (and through the period covered by this analysis), an agency's per-visit costs have been judged reasonable as long as they do not exceed 112 percent of the mean cost incurred by all agencies (for the agency's mix of visits) in the same

[1]Skilled nursing services are covered as long as (1) a physician has ordered them, (2) the services are required on a part-time or intermittent basis, (3) the services require the skills of a registered nurse (or of a licensed practical nurse or licensed vocational nurse under a registered nurse's supervision), and (4) the services are reasonable and necessary to treat an illness or injury. Physical therapy and speech therapy are covered if a physician's assessment recommends them. Beneficiaries who need only occupational therapy are entitled to benefits only if they have established a prior need for skilled nursing care, speech therapy, or physical therapy in the current or prior certification period (see Teplitsky and Janson 1985-1992, p. VII.23, Section 204.4).

geographic area. Agencies incurring aggregate costs that exceed these limits were reimbursed only up to the limits (known as the Section 223 limits).

Expenditures for home health care represent a material proportion of all Medicare expenditures (more than nine percent in fiscal year 1995), and these expenditures have been growing rapidly in recent years (Health Care Financing Administration 1997). Spending for Medicare home health services has grown at least 20 percent a year since 1989, the year in which coverage was broadened as part of the settlement of a lawsuit brought against HCFA. After a 53 percent spike in annual growth in 1990, however, the rate of growth has declined (ProPAC March 1996). Little of the growth is due to increases in cost per visit; rather, it is due to increases in the number of beneficiaries receiving Medicare home health care and the number of visits provided to beneficiaries.

Since the program's inception, the number of Medicare-certified agencies has more than quadrupled. In 1995, there were roughly 8,700 Medicare-certified home care agencies (ProPAC March 1996). Administratively, home health agencies have different ownership and auspices. They can be freestanding for-profit, freestanding nonprofit, affiliated with a facility (such as a hospital or skilled nursing facility), or operated by a government entity. Most of the recent growth in the number of Medicare-certified agencies has been in the number of hospital-based and freestanding for-profit agencies (ProPAC March 1996). The distribution of ownership/auspices varies considerably by region of the country. Government-operated and private nonprofit agencies dominate the Northeast. Freestanding, for-profit agencies are pervasive in the South and West and even dominate the markets in some states.

Similarly, the number of Medicare-covered visits per episode and the length of episodes vary widely across regions. For example, among beneficiaries admitted to home health in 1990 and 1991, the mean number of approved visits in an episode of home health care was 47, and the mean episode

length was 94 days. However, the mean number of visits per episode varied from 28 in the Pacific region to 95 in the East South Central region, and the mean episode length varied from 60 days in the Pacific region to 180 in the East South Central region (Schore 1995). In 1994, the mean visits per beneficiary served grew to 66 nationally but varied from 45 in the Pacific region to 106 in the East South Central region (Health Care Financing Administration 1996).

The dramatic growth of home health as a proportion of total Medicare spending, combined with striking regional variation in its use and the explosive growth of the home health industry, prompted Congress to legislate changes to the Medicare home health benefit as part of the Balanced Budget Act of 1997. The act mandates the implementation of per-episode prospective payment for Medicare home health by 1999.

B. THE PER-EPISODE DEMONSTRATION

As indicated, during the period covered by this analysis the regular Medicare home health payment system reimbursed agencies for allowable costs up to a limit based on 112 percent of the mean national cost. Because there is no mechanism for home health agencies to realize savings beyond costs, this system provides no incentive for producing services efficiently and, in effect, subsidizes inefficient providers. Per-Episode Prospective Payment is meant to increase efficiency, using the opportunity to generate savings as the primary incentive.

Ninety-one Medicare-certified home health agencies in five states--California, Florida, Illinois, Massachusetts, and Texas--enrolled in the three-year per-episode demonstration.[2] Forty-seven of them were randomly assigned to the treatment group to receive per-episode payment. The remaining

[2]Reflecting the United States more generally, considerable variation existed in the use of Medicare home health across the five demonstration states. In 1995, the mean numbers of visits provided per beneficiary using home health were as follows: California, 54; Illinois, 55; Florida, 81; Massachusetts, 94; and Texas, 117 (Health Care Financing Administration 1997).

44 were assigned to the control group to continue under cost reimbursement. The first agencies in the treatment group began implementing prospective payment in June 1995; the latest entrants began in January 1996. Each agency started as its fiscal year began. Demonstration operations will continue through December 1998.

Mathematica Policy Research, Inc. (MPR) is the evaluation contractor responsible for assessing the impacts of the demonstration and its implementation. Several other organizations are also participating. Abt Associates, Inc., is the implementation contractor responsible for recruiting demonstration agencies, monitoring the status of demonstration operations, and calculating certain statistics needed for agency payment. Palmetto Government Benefits Administrator (PGBA) is the FI responsible for review of claims and agency payment for both treatment and control agencies. The Center for Health Policy Research (CHPR) at the University of Colorado is the quality assurance contractor responsible for designing and implementing a quality assurance system for the demonstration agencies.

1. Demonstration Payment and Incentives

HCFA developed the Home Health Prospective Payment Demonstration to assess whether the profit motive can increase the efficiency of providing Medicare home health care and thereby reduce public expenditures without sacrificing access to care or the quality of care. Phase I of the demonstration, which tested per-visit prospective rate setting, provided agencies an opportunity to generate profits (and avoid losses) by reducing per-visit costs.[3] The current phase of the

[3] The per-visit demonstration was implemented in the same five states; however, most of the agencies participating in the per-episode demonstration did not participate in the per-visit demonstration. (Only agencies in the per-visit control group were eligible.) For details on the per-visit demonstration results, see Brown et al. (1995).

demonstration, Phase II, tests per-episode prospective payment. Under per-episode payment, agencies may earn profits by reducing the number of visits, as well as by reducing per-visit costs.[4]

a. Payment

Agencies selected for the treatment group receive a lump-sum payment for the first 120 days of home health care, regardless of the number or cost of visits provided.[5] The agencies are thus "at risk" for the costs of care incurred during this period. Those agencies that can provide care for less than the fixed (per-episode) rate will generate profits, whereas those whose costs exceed the fixed rate will incur losses.

For each visit beyond 120 days (referred to as outlier visits), treatment agencies receive a fixed payment rate that varies by the type of visit. In the demonstration, a treatment agency is also paid on a per-visit basis for visits made to patients admitted before the agency began demonstration operations ("phase-in" visits) and to those admitted within 120 days of the end of demonstration operations in that agency ("phase-out" visits). Agencies that can provide an outlier, phase-in, or phase-out visit for less than the fixed (per-visit) rate can also generate profits.

In the demonstration, home health episodes are defined by gaps in Medicare covered home health care of at least 45 days. Only after the 120-day risk period and a 45-day gap in services can an agency receive a new per-episode payment for a given Medicare beneficiary.

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[4]Strictly speaking, only for-profit agencies earn profits; nonprofit agencies generate surpluses. However, for brevity, we use the term "profits" in this report to refer to surpluses generated by nonprofit agencies, as well as profits earned by for-profit agencies.

[5]Durable medical equipment, nonroutine medical supplies, and Part B ambulatory home health services continue to be reimbursed at cost throughout the demonstration. In addition, if an agency did not provide one or more of the six Medicare services during the base year but begins to do so during the demonstration, those visits are also reimbursed at cost, as are the costs of care for which Medicare is a secondary payer.

b. Rate Setting

Prospective per-episode rates are based on an agency's costs and episode profile in the fiscal year preceding its entry into the demonstration (the base year), adjusted for inflation and changes in case mix in each evaluation year.[6] The episode profile is the average number of visits provided by the agency during an episode, calculated for each of the six types of visits covered by Medicare. Payment for outlier, phase-in, and phase-out visits are also based on the agency's base-year per-visit costs (adjusted for inflation).[7] HCFA's market basket is used to adjust both the per-visit and per-episode rates for inflation.

The case-mix adjuster classifies each patient into one of 18 groups on the basis of 12 patient characteristics (for example, physical functioning and medical condition). From this information, an aggregate case-mix index is created for each agency. At the end of each year of the demonstration, an agency's case-mix index for that year is compared with its case-mix index in the base quarter (the last quarter of the base year). If the agency's case mix differs, its aggregate payment is retrospectively adjusted.

c. Loss Sharing and Profit Sharing

To encourage agencies to participate in the demonstration, HCFA provided a loss-sharing arrangement in which treatment agencies are reimbursed for 99 percent of losses in the first demonstration year, and for 98 and 97 percent of losses in the second and third years of the demonstration, respectively, subject to total payments being within the Section 223 limits.

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[6]For more information on payment rates under the demonstration, see Phillips et al. (1995).

[7]Because complete data for episode profiles and settled cost reports are not available for a given year until some months after that year is over, the initial lump-sum and per-visit rates used in the demonstration were preliminary and were revised as final base-year data became available.

To counteract the incentive to reduce the quality of care to generate profits, as well as to prevent agencies from realizing windfall profits at public expense, HCFA shares in profits above a specified threshold profit rate. If the total of a treatment agency's per-episode and per-visit prospective payments is greater than the costs incurred in rendering the services covered by these payments, profit greater than five percent of total allowable costs for these services is subject to profit sharing with HCFA. HCFA's share of profits is 25 percent if profits equal between 5 percent and 15 percent of total allowable costs. HCFA's share rises if profits exceed 15 percent (with the share of profits over 15 percent varying by demonstration year).

d. Incentives

Treatment agencies can reduce the cost of care rendered during the 120-day period by (1) reducing the number of visits provided during the risk period, (2) changing the visit mix to make less costly visits a larger proportion of the total number, or (3) reducing per-visit costs (or some combination of these three). Reductions in the number of visits during the risk period could involve discharging patients earlier, thereby reducing the length of the episode or reducing the frequency of visits without reducing episode length. Reductions in the average number of visits could also be achieved by admitting a mix of patients needing less care, though this may also result in a lower payment. Reductions in per-visit costs could be achieved either by cutting direct costs (such as the length of a visit) or administrative costs (such as supervision). Alternatively, agencies might accept increases in per-visit costs to reduce the number of visits during the risk period. For example, agencies might hire wound care specialists (who command higher salaries) and thereby reduce the number of visits, or they might use additional administrative resources to monitor the number of visits provided and thereby increase per-visit costs. Per-visit costs might also increase if agencies perform in a single longer visit services that they previously provided in (and billed for as) two

separate visits. In addition, as agencies reduce visits during the risk period, they may experience a reduction in the direct-cost base over which their administrative costs must be spread, which may mean some loss in economies of scale. As a result, treatment agencies have an incentive to increase the number of outlier (and phase-in and phase-out) visits to help offset any volume reductions due to decreases in the number of visits during the risk period, as well as to increase the number of patients they serve.

Profit motive is the prime incentive offered under the demonstration. While treatment agencies may incur losses, the generous loss-sharing provisions of the demonstration limit the incentive for agencies to alter their behavior to avoid losses, particularly in the first demonstration year. Thus, the demonstration's incentives rely heavily on the "carrot" of profits and very little on the "stick" of losses.

Agencies' responses to the incentives offered by the demonstration will depend on the priority each agency places on maximizing profits, relative to other goals. Nonprofit agencies, in particular, may view their primary mission as meeting the needs of the communities they serve. Consequently, they may be more reluctant than for-profit agencies to reduce visits during the risk period, on the grounds that doing so would reduce care to those in need. The demonstration, however, does provide nonprofit agencies with an opportunity to generate profits that could then be used to develop programs of benefit to their community or to provide services to those in the community who cannot obtain them in other ways (such as through Medicaid, other public programs, or private purchase).[8]

[8]It is theoretically possible that nonprofit agencies might take advantage of the loss-sharing provisions to increase visits during the risk period, if they believe that under the demonstration Medicare has restricted the provision of needed care. Nonprofit agencies might treat the loss-sharing provisions as a source of community service funds, accessible with a small amount of funding (equal to one, two, or three percent of losses) from private sources.

Given the demonstration's emphasis on profit motive, we expect for-profit agencies to respond more aggressively than nonprofit agencies to the incentive of per-episode prospective rate setting. We also expect that hospital-based agencies may be less responsive than freestanding agencies to the opportunity to earn a profit under the demonstration. The former must respond to the hospital's need to discharge patients promptly and to "flow down" hospital administrative costs to the home health agency. Attention to the needs of the parent organization may also affect the behavior of other agencies that belong to a chain or other system of organizations.

2. Other Demonstration Procedures

a. Medical Review

For agencies in the treatment group, only limited medical review (known as "abbreviated" medical review) is performed by the demonstration FI for care delivered during the risk period. This review seeks to determine whether the patient met the coverage criteria for home health care and whether at least one visit met these criteria. Only the admission bill is reviewed. As a condition of payment, the demonstration FI requires that the agency submit HCFA 485 and 486 forms (which contain information on the patient's health and eligibility status, as well as the home health plan of treatment) or clinical notes for admissions that coincide with an episode eligible for prospective payment. The medical review process is based on these materials.

All visits paid for under per-visit rate setting are subject to the usual focused medical review, under which a sample of claims is reviewed to ensure that each visit is medically reasonable and necessary. Medical review for control agencies continues under the current (nondemonstration) regulations. The only major difference is that control agencies are assigned to the demonstration FI. Since the demonstration FI's medical review procedures may differ in minor ways from those of

other FIs, control agencies may be subject to policies somewhat different from those they are accustomed to.

b. Billing

To have an episode of care initiated, treatment agencies must submit an admission bill to the demonstration FI. They are expected to submit interim bills for the rest of the risk period, although payment for visits is not predicated on their submission.[9] The agency must bill separately for any outlier visits. When a patient is discharged, either during the risk or outlier period, agencies must submit a discharge bill to terminate the episode. The FI will not initiate a new episode for a given patient unless a prior episode has been terminated. In addition, before initiating a new episode, the FI checks that the 120-day risk period and a 45-day gap have elapsed.

If a treatment admission claim is accepted (following abbreviated medical review), the per-episode payment is made as a lump sum.[10] While medical review is pending, subsequent episode bills are suspended. Initially, all episodes were subject to abbreviated medical review; in mid-1996, however, the proportion was reduced to 25 percent.[11] It was reduced because it took longer than expected to review the claims, delaying payments significantly; yet very few claims were denied.

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[9]The interim bills are required for reimbursement for supplies and calculation of costs for profit and loss sharing with HCFA. Interim bills also provide information on number of visits required for the evaluation.

[10]If the admission claim is denied, interim claims for that episode are suspended for 65 days to await appeal. If an appeal is filed, interim claims are suspended also until a decision is made on the appeal for the admission claim. When an admission claim is denied and an appeal is not filed within 65 days, or if the denial of the admission claim is upheld on appeal, suspended interim claims are released for possible payment under the agency's per-visit prospective payment rates.

[11]Abbreviated medical review was required for all episodes during most of the early months of the demonstration included in this analysis.

Since it is unrealistic to have 100 percent medical review in a national program, medical review was reduced.

Periodic interim payments (PIPs), which are intended to smooth cash flow for home health agencies, were originally discontinued for treatment agencies. However, a similar periodic payment system, called biweekly interim payments (BIPs), was later reintroduced to meet the cash flow needs some treatment agencies experienced when per-episode payments were delayed.

Control agencies continue to submit bills as under cost reimbursement and continue to be eligible for PIP. The demonstration FI bases PIP payments on the agency's average cost for each type of visit, while other FIs base PIP payment on overall agency average cost per visit. As a result, there may be minor differences in control agency PIP payments compared to what control agencies have experienced outside the demonstration.

c. Quality Assurance

All agencies participating in the demonstration (in both the treatment and control groups) are required to collect and submit patient-specific information to the demonstration quality assurance contractor. The quality assurance procedures follow a continuous quality improvement approach. Visiting staff from demonstration agencies are required to collect information (primarily on functional status and medical condition) at admission and either at discharge or 120 days after admission, whichever comes first. Similar information is also collected before admission to an inpatient facility (for a stay of 48 hours or more) and when the patient returns to home health care following such an inpatient stay. The quality assurance contractor uses this information to develop profiles describing patient outcomes at each agency. These profiles are provided to the demonstration agencies to help them improve the quality of care they provide.

C. COMPONENTS OF AND APPROACH TO THE EVALUATION

The evaluation seeks to answer two broad sets of policy questions: (1) How did home health agencies make decisions about participating in the demonstration and how did they implement the demonstration? and (2) To what extent did per-episode prospective payment for home health affect the behavior of home health agencies and outcomes for their patients--that is, what was its impact? These areas of inquiry are interrelated. Impacts can be interpreted only in light of how per-episode prospective payment was implemented by agencies participating in the demonstration and within the context of how the demonstration operated. It is critical to understand which strategies help produce more efficient home health care and how government can best shape policies to encourage such strategies among agencies with widely differing missions and characteristics. In addition, the nature and extent of program impacts must be determined if properly focused analysis is to be done on decisions and operations of agencies that were particularly successful (or unsuccessful) in improving efficiency. The integration of these two analyses is a key aspect of our evaluation. (For a detailed discussion of the evaluation design, see Phillips et al. 1995.)

1. Analysis of Agency Decisions and Operations

The analysis of agency decisions and operations focuses primarily on five questions:

1. What factors explain the decision of home health agencies to participate in the demonstration?
2. Was the demonstration implemented as planned?
3. What strategies did agencies adopt to reduce visits per episode and per-visit costs?
4. What were the effects of these strategies on the process of care, and what implications do these effects have for access to care and quality of care?

5. What factors explain the key decisions of home health agencies?

To answer these questions, the evaluation took a case study approach that included judgmentally selecting 67 of the participating agencies for site visits at the start and at the conclusion of the demonstration. The goal in selecting agencies for site visits was to obtain as much information as possible about various agency environments, decision-making processes, and responses to the demonstration. The site visit data are supplemented with program records and discussions with others involved in the demonstration.

The following were the key conclusions of the first report on agency decisions and operations (Phillips and Thompson 1997), which was based on site visits conducted during the first half of 1996 (and the supplemental material just described):

- Most agencies saw the demonstration as an opportunity to learn, with limited financial risk, about operating under prospective payment. Over half (including both for-profit and nonprofit agencies) saw generating a profit or surplus as another key objective.

- Most agencies characterized the home health environment in which they operated as highly competitive, although hospital-based agencies perceived competition as less intense (probably because they had "protected" referral streams). Nearly half the agencies receiving site visits reported that there was an oversupply of agencies in the communities they served.

- More than 80 percent of agencies had Medicare managed care plans operating in the areas they served. This varied from 100 percent of California and Florida agencies to 70 percent of Texas agencies. Even though managed care was widespread, however, most demonstration agencies served few managed care enrollees.

- Agencies expected growth rates during the demonstration to be dramatically different from those that prevailed only a few years ago. About half expected to increase the number of patients seen, with anticipated growth rates averaging about nine percent a year. About 15 percent of agencies expected to shrink, with expected declines in caseloads averaging about 8 percent.

- Treatment and control agencies planned to reduce their costs per visit during the demonstration. The most common strategy planned was to reduce administrative costs; another approach was to increase use of technology.

- About half of treatment agencies planned to reduce per-episode costs. Strategies cited for reducing costs included reviewing utilization more intensely, rationalizing the process of care through care maps (or critical pathways), placing greater reliance on community services and family caregivers, and increasing use of telephone contact with patients.

A second report will investigate the implementation of demonstration procedures and responses to demonstration incentives as they evolved during the three-year demonstration. We will also prepare a quantitative analysis of the factors associated with agency participation in the demonstration.

2. Analysis of Program Impacts

In this section, we provide an overview of the issues addressed by the analyses of program impacts. This report is one of a series of preliminary impact reports that rely on data describing patients who were admitted to demonstration agencies during roughly the first year of the demonstration. Other preliminary reports will examine early demonstration impacts on home health use, home health costs, and the quality of home health care. A series of final reports planned for mid-1999 will rely on data describing patients admitted throughout the three-year demonstration.

Many of the critical policy issues to be addressed in the evaluation pertain to program impacts--the extent to which per-episode prospective payment for home health care affects the behavior of home health agencies and outcomes for their patients. Controlling public expenditures for home health care would be a primary objective of a national program of prospective payment for home health agencies. A key aim of the evaluation, therefore, is to determine the potential for savings by measuring the impact of per-episode prospective payment on per-episode service use. Because per-episode prospective payment may alter per-visit costs and the mix of visits rendered, as well as the number of home health visits, it will be necessary to identify the relative importance (to any

expenditure reductions) of changes in the cost of producing a visit and in the number and types of visits rendered. It will also be important to assess whether effects on service use and agency behavior are likely to affect access to or quality of care, as well as the extent of any such effects. Through its potential effect on access to and quality of care, per-episode prospective payment may shift care to nursing homes or hospitals, to programs that provide community-based services, or to informal caregivers (that is, family members and friends). The evaluation will also identify the extent of such shifts and implications for the overall burden and cost of care borne by public programs (including Medicaid) and informal caregivers.

These policy issues suggest the following key research questions concerning demonstration impacts:

- What effect does per-episode prospective payment have on Medicare home health services received during the risk period, the outlier period, and overall?
- What effect does per-episode prospective payment have on per-visit costs for Medicare-certified home health agencies and on the volume and types of services these agencies provide?
- What effect does per-episode prospective payment have on patient selection and retention and, thus, on access to care?
- What effect does per-episode prospective payment have on quality of care?
- What effect does per-episode prospective payment have on Medicare expenditures generally?
- What effect does per-episode prospective payment have on the use of and expenditures for non-Medicare-covered services, including the use of Medicaid services, other home- and community-based services, and informal care?
- Do the effects of per-episode prospective payment vary with the characteristics of the patient or the agency?

D. HYPOTHESES CONCERNING THE EFFECT OF PER-EPISODE PAYMENT ON THE USE AND COST OF MEDICARE SERVICES

Home health agencies were expected to change their approaches to service provision in response to the financial incentives of per-episode payment. A key expectation of the demonstration was that agencies receiving a per-episode payment would reduce the number of visits provided or change the mix of visits provided to be less costly during the risk period (that is, the first 120 days following home health admission). In fact, the preliminary analysis of the impact of per-episode payment on home health use found that agencies receiving this type of payment reduced the number of visits provided by about 17 percent, from 45 to 37 visits during the risk period. This reduction, however, was basically uniform across types of visits, so agencies did not substantially change the mix (Cheh et al. 1997). Agencies were also expected to reduce per-visit costs by, for example, reducing the length of visits, using less costly staff to provide visits, or reducing training or supervision levels or other administrative costs. (The effect of the demonstration on home health agency costs will be the subject of a later report.)

Reductions in the number of visits provided (or the cost per visit) might result in poorer care quality and patient outcomes (such as declines in functional ability or health). Poorer patient outcomes might then be reflected in higher levels of use of other types of services, in particular inpatient hospital admissions and emergency room visits. Clearly, if home health visits are reduced past a certain point, patients will suffer outcomes adverse enough to be reflected in the increased use of other services. It is unclear, however, what level of visit reduction will have these consequences.

Analysis of the effect of home health use on the use of other services has been limited, and the conclusions of studies that have been undertaken are mixed. A comparison of home health use in the fee-for-service and managed care sectors found that HMOs cut back markedly on home health visits per episode and that this reduction may have contributed to poorer functioning among HMO

enrollees (Shaughnessy et al. 1995). On the other hand, studies of regional variation in home health use suggest that modest to moderate reductions in home health visits may not lead to poorer patient outcomes (and increased use of other services) (Welch et al. 1996; ProPAC June 1996; and Schore 1995). The wide variation across regions in the number of visits provided suggests that considerable discretion may be involved in planning the amount of home health care for a given patient. Discussions with treatment agency staff at the start of the demonstration supported the notion that some visits could be eliminated without adversely affecting patient care. Agencies expected to accomplish this by more aggressively enlisting the support of family members and home- and community-based service providers and by providing patient education earlier in an episode of care (thereby making patients independent sooner). It is noteworthy that, although the Per-Visit Home Health Payment demonstration gave rise to a small reduction in home health visits, the demonstration had no effect on the use of other Medicare-covered services (Schochet 1995).

For several reasons, agencies are unlikely to alter service provision enough to adversely affect overall care quality. First, in the current highly competitive home care environment, agencies will be unwilling to damage their reputations among referral sources for the sake of making a profit during the demonstration. Second, visiting staff (nurses, therapists, and aides) tend to have a strong personal and professional commitment to providing high-quality care. Thus, even if agency management planned to cut services drastically during the demonstration, it would be difficult to convince visiting staff to do so. Finally, the demonstration included an external process for assuring care quality. To the extent that these factors mitigate the adverse effects changes would have on care quality, subsequent increases in the use of Medicare services would also be mitigated.

Reductions in the provision of home health care might lead to the substitution of services in other settings (such as skilled nursing facilities or hospices) even if they do not have a deleterious

effect on home health care quality and patient outcomes. Agencies that may benefit financially from discharging patients who have proven costly to treat may, after an initial period of home health care, persuade patients (and their families and physicians) that some other setting might be more appropriate (for example, a skilled nursing facility or hospice). Similarly, if agencies become more aggressive about declaring patients no longer homebound, physician visits may increase to substitute for some care that under the current cost-reimbursement system would have been delivered in the patient's home.

Earlier discharge from demonstration agencies might also cause patients to receive more services from other home health agencies. Earlier discharge from demonstration agencies, however, may reflect either inadequate or more-efficient home health care. If demonstration home health agencies inappropriately curtail visits to patients who need them and another agency provides the needed care, the use of "other home health" services reflects poor care on the part of the demonstration agency. On the other hand, if demonstration agencies eliminate discretionary visits at the end of an episode but the patient has become accustomed to receiving home care and feels the need for additional visits, another home health agency might be persuaded to provide them. In a highly competitive home health environment, this might not take much "persuading," even for a patient only marginally qualified for home health care (or not qualified at all). In this case, the use of "other home health" reflects additional unnecessary costs to the Medicare program.

In addition to assessing demonstration-induced changes in the use of other Medicare-covered services as a result of declines in home health care quality or substitution of other care settings, we also assess the effectiveness of per-episode payment in containing overall Medicare costs.

E. GUIDE TO THIS REPORT

The second chapter of this report describes the data sources, samples, and statistical methodology used in this preliminary analysis of impacts on Medicare service use and reimbursement. Chapter III presents and summarizes the findings of this analysis and describes the remaining research to be done.

II. DATA, SAMPLE, AND METHODOLOGY

The preliminary analysis of demonstration impacts on Medicare service use and reimbursement relied primarily on data from Medicare claims files describing services received during roughly 51,000 home health episodes for patients admitted to 87 demonstration agencies before September 1996. Claims data were used to construct Medicare service use measures pertaining to the 120 days following home health admission (the "risk period"). We estimated demonstration impacts using regression models that predicted the use of and reimbursement for Medicare-covered services during the risk period controlling for possible pre-existing differences between treatment and control agencies, or differences in their patients, that could be confounded with the impacts of prospective payment.

A. DATA

Medicare claims files were the source of outcome variables describing service use and reimbursement during the risk period. The outcome variables were combined with data from several other sources to form control variables for the analysis:

- Uniform Billing (UB-92) forms, collected by the demonstration FI, that include data describing the patients' health and functional status at the time of home health admission (in addition to home health billing information)
- HCFA's Medicare Enrollment Database (EDB) from which we identify patients' gender, age, original reason for Medicare eligibility, and if the patient has died, date of death
- HCFA's Standard Analytic Files, which provide information on the use of and reimbursement for Medicare services during the six months preceding and the weeks immediately before home health admission (as well as during the risk period)
- Agency cost reports for the year prior to enrolling in the demonstration (the "base year"), which provide basic agency characteristics (such as for-profit status and size)

- Area Resource Files (ARF), which provide data describing health service supply and patterns for the counties in which agencies were located

From these varied sources, we constructed an analysis file in which each observation contained data on (1) outcome variables describing the patient's use of Medicare-covered services during the 120-day risk period; (2) the patient's characteristics at admission to home health; (3) the patient's Medicare service use before the home health admission; (4) the predemonstration characteristics of the home health agency providing care, including an indicator of comparative practice pattern; and (5) the characteristics of the county in which the agency is located.

1. Identifying Episodes and Risk Periods

The measures of Medicare service use and reimbursement in this analysis were constructed for patients admitted for home health care between the agency's demonstration start date (June 1995 for the first agencies to enter and January 1996 for the latest) and August 31, 1996. Thus, our analysis includes patients with home health episodes that began during the first 8 to 15 months of the demonstration.

Using demonstration rules governing the start of an episode, we defined episodes of home health care from UB-92 home health bill records obtained from the demonstration FI. Beginning with each agency's enrollment in the demonstration, we scanned the UB-92 files to identify the first admission for each patient and all subsequent bill records. To create an episode, we combined all records for an individual for the 120 days following the first admission and any bills for care after 120 days until we observed a gap of at least 45 days in billing dates. This procedure was followed regardless of whether the agency discharged and readmitted a patient during the 165 (120 + 45) days. If we observed additional home health bills after 165 days, we created a second episode for that individual,

and so on for any subsequent episodes beginning through August 31, 1996. We created a total of 57,754 home health episodes.

The period beginning with the home health admission and continuing through the next 120 days (the "risk period") is the reference period for this preliminary analysis. That is, all outcomes are measured and demonstration impacts estimated over the 120-day risk period. The risk periods associated with episodes included in the preliminary analysis fall between June 1995 (when the first agencies joined the demonstration) and December 1996.

2. Medicare Claims for Outcomes Variables

Claims data from HCFA's Standard Analytic Files were matched to episode risk periods identified with UB-92 data. Claims data were then used to construct measures of Medicare service use and reimbursement during the risk period. Of the 57,754 episodes identified with UB-92 data, matches were made for 57,216; only 538 episodes (less than one percent) did not match.

Medicare claims were extracted from the Standard Analytic Files in May 1997. Since claims are generally included in these files within four months after the service was rendered, outcome variables should be complete for all Medicare services received through December 1996.[1]

The specific services described by the outcome variables examined in this analysis are inpatient hospital, emergency room, skilled nursing facility, hospice, nondemonstration home health, outpatient hospital, physician and other practitioner, durable medical equipment, and other Medicare Part B services. (See Table II.1.) In this analysis we describe demonstration impacts on the use of home health care delivered only by agencies *other than demonstration agencies;* impacts on the use

[1]This is why we chose the August 31 cutoff date, since it allows for complete data to be extracted for the entire at-risk period.

TABLE II.1

OUTCOME VARIABLES DESCRIBING MEDICARE-COVERED SERVICE USE AND REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

Inpatient Hospital Services	Nondemonstration Home Health Services[b]
Any admission	Any admission
Number of admissions	Number of visits
Number of days	Reimbursement[a]
Reimbursement[a]	
	Outpatient Hospital Services[c]
Emergency Room Services	Any services
Any inpatient admission with emergency room revenue center	Reimbursement
Number of inpatient admissions with emergency room revenue center	Physician and Other Practitioners
Any outpatient emergency room visits	Any visits
Number of outpatient emergency room visits	Reimbursement
Total number of emergency room encounters	
	Durable Medical Equipment
Skilled Nursing Facility Services	Any purchases
Any admission	Reimbursement
Number of admissions	Other Part B Services[d]
Number of days	Any use
Reimbursement[a]	Reimbursement
Hospice Services	Total Reimbursement
Any admission	Part A[e]
Number of days	Part B
Reimbursement[a]	Total[f]

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

[a]Reimbursement is composed primarily of payments under Medicare Part A but also includes a small number of payments for services under Medicare Part B.

TABLE II.1 *(continued)*

[b]Home health services provided by an agency other than the treatment or control agency that originally provided the identifying home health admission.

[c]Includes both emergency and nonemergency visits to hospital outpatient facilities, as well as the use of outpatient services such as diagnostic laboratory and radiology.

[d]Includes diagnostic laboratory and radiology services from non-hospital providers (including pathologist and radiologist services), supplies and devices, mammography, ambulance, covered medications, blood, and vaccines.

[e]Excludes reimbursement for home health services provided by demonstration agencies. Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

[f]Excludes reimbursement for home health services provided by demonstration agencies.

and cost of demonstration home health care are the subject of other project reports (Cheh et al. 1997; and Cheh forthcoming, respectively).

For most outcome measures, the following three categories of variables were constructed:

- Any Use of Services: indicator variables equal to one if services were used, and zero otherwise
- Intensity of Service Use: variables signifying the number of admissions, visits, or days
- Medicare Reimbursement: continuous variables describing the cost of the service to the Medicare program

3. Control Variables

We used several types of control variables in regression models for the preliminary impact analyses: patient characteristics at the start of home health episodes, agency characteristics at the start of the demonstration, area characteristics, and (patient-level) lagged values of dependent variables (see Table II.2). Control variables in statistical models account for exogenous differences that may have existed between treatment and control agencies and their patients despite random assignment.

Patient Characteristics. Patient characteristics at the start of an episode and Medicare service use preceding the episode controlled for differences between the patients of treatment and control agencies. We expect that differences in severity of illness and physical functioning will affect the need for home health care. For example, individuals who are more-severely ill, have diagnoses requiring greater amounts of care, and have greater limitations in daily activities may require more Medicare home health services. We obtained data on patient characteristics at the start of the home health episode from three sources: (1) UB-92 forms, which collected patient characteristics for the

TABLE II.2

STANDARD CONTROL VARIABLES FOR MULTIVARIATE ANALYSIS, BY SOURCE

Episode Level		Agency Level		Area Level
Patient Characteristics at Episode Start	Medicare Service Use Preceding Episode (Medicare Standard Analytic Files)	Base-Quarter Patient Service Use (Demonstration Case-Mix File)	Agency Characteristics	County Characteristics (Area Resource File)
UB-92 Remarks	Length of inpatient stay during two weeks before home health	Agency practice pattern index	Base Year Cost Reports	Physicians per 10,000 (1994)
Has cancer	Whether in skilled nursing facility during two weeks days before episode start		Was hospital-based	Nursing home beds per 100 elderly residents (1991)
Has diabetes			Profit status	Hospital occupancy rate (1993)
Had stroke	Total Part A Medicare reimbursement in six months prior to episode start		Agency size	Mean Medicare reimbursement per beneficiary (1991)
Has decubiti stage 3 or 4			State	
Needs complex wound care			Implementation Contractor	
Has limitations in bathing, eating, dressing, toileting, transferring			Urban/ rural indicator	
Admitted to home health from hospital			Chain membership	
Medicare Enrollment Database				
Age				
Gender				
Race				
Original reason for entitlement				
Had Medicare for less than six months				

NOTE: Control variables in regression models for estimating the impact of per-episode payment on the use and cost of Medicare-covered services also included a lagged value of each dependent variable, measured over the six months prior to home health episode start and based on data from the Medicare Standard Analytic Files.

demonstration's case-mix adjuster; (2) the Medicare Enrollment Database, and (3) Medicare Standard Analytic Files.

In the remarks field for the first UB-92 bill following a demonstration admission, both treatment and control agencies were required to submit the information on patient characteristics needed for the 18-category Home Health Utilization Group (HHUG) case-mix adjuster. The characteristics include measures of impairment in activities of daily living, whether the patient had certain medical conditions (cancer, diabetes, stroke, decubiti) and care needs (complex wound care), and whether the patient was admitted to home health directly from a hospital.

Medicare enrollment files provided basic demographic information, including the patient's age (at the start of home health episode), gender, race, disability status (from the original reason for Medicare qualification), and whether patient had had Medicare coverage for the full six months prior to home health admission (the period over which lagged dependent variables were constructed).

The Standard Analytic Files provided data to construct measures of Medicare service use and reimbursement, measures that served both as proxies for health status or severity of illness at the time of home health admission and as predemonstration values of dependent variables (sometimes referred to as lagged dependent variables). Severity of illness was reflected in measures of the length of a hospital stay ending during the two weeks before home health admission (which was zero for patients who had not been in the hospital during that period), whether the patient had been in a skilled nursing facility during those two weeks, and total Medicare Part A reimbursement during the six months before home health admission. Lagged dependent variables are the best predictors of use and reimbursement during the risk period and account for differences between treatment and control agency patients in the use of Medicare services before the start of demonstration home health episodes. Lagged variables for this analysis comprised measures of Medicare service use and

reimbursement, by type of service, during the six months before the home health episode. (Table II.1 describes lagged variables as well as outcome measures.)

Agency Characteristics. Agency characteristics at the start of the demonstration were used as control variables because different types of agencies may have different goals and different cost and management structures, which could affect the care they render. In addition, certain types of agencies may have different practice patterns or patient mixes and thus provide different types or levels of care than other agencies. For example, proprietary and nonprofit agencies might have different preexisting practice patterns with respect to the number of visits rendered per episode, and hospital-based agencies might serve somewhat more-acutely ill patients than freestanding agencies.

Data on agencies' structural characteristics were obtained from base-year Medicare cost reports and from the demonstration implementation contractor. Medicare cost reports provided information on the agencies' base-year characteristics, including profit status, whether the agency was hospital-based, and its size (as measured by total number of visits rendered). The implementation contractor supplied information about chain membership and whether agencies were located in rural or urban areas (according to the census definition).

We also developed a control variable measuring each agency's predemonstration practice pattern for the 120-day period. This practice pattern variable is an index of the average number of visits per episode provided by an agency in the first 120 days of base-quarter episodes relative to the average number provided by other demonstration agencies. The index accounts for differences across agencies in the average number of visits of each type and the characteristics of the patients.[2]

[2]The specific construction is as follows. Let subscript i refer to the service type and subscript j refer to case-mix cell. Using the case-mix adjuster (developed by the implementation contractor), we classify an agency's patients into one of 18 case-mix cells (j=1....18). Within each case-mix cell, we multiply the average visits of each type for a given agency (n_{ij}) by its national cost limit in the (continued...)

A value greater than one indicates that, controlling for differences in case mix, an agency provided more visits during the 120-day period than did other demonstration agencies during the quarter preceding the demonstration.

Area Characteristics. County-level health service supply might also influence the care a home health agency renders. For example, in areas where the number of nursing home beds is limited (relative to demand), hospitals may discharge to home health care patients who otherwise would be discharged to a nursing home. We obtained county-level characteristics from the ARF, including the number of physicians per 10,000 residents, the number of nursing home beds per 100 elderly residents, and hospital occupancy rates. We also obtained mean Medicare reimbursement per beneficiary to capture county-level differences in overall practice patterns and health care costs.

B. ANALYSIS SAMPLE

The sample for the preliminary analysis of the impact of per-episode payment on Medicare services is composed of 51,314 (90 percent) of the 57,216 episodes created from UB-92 data and matched to Medicare claims files. Episodes were excluded from the analysis file for several

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[2](...continued)
base year (w_i), and then sum across each of the visit types. This sum essentially reflects a weighted count of the average visits for an agency within a case-mix cell. Second, we use these weighted counts to construct the ratio of the agency's average number of visits received by patients in the case-mix cell to the average among all agencies for this cell ($\Sigma w_i N_{ij}$). Finally, for each agency, we arrive at the practice pattern index by summing across the 18 case-mix ratios, weighting each ratio by the agency's proportion of episodes in the case-mix cell during the base quarter (p_j). Thus, for each agency, the index practice pattern is given by:

$$\sum_j p_j \left(\frac{\sum_i w_i n_{ij}}{\sum_i w_i N_{ij}} \right)$$

reasons.[3] First, all episodes for 3 of the 91 agencies that originally enrolled in the demonstration (2 controls and 1 treatment) were excluded because the agencies withdrew from the demonstration after participating for only a few months. The agencies were purchased by or merged with other agencies, and the new ownership did not want to be part of the demonstration. Loss of these agencies accounted for the exclusion of 1,613 episodes. A fourth demonstration agency was excluded from the analysis because the agency had no admissions during the period covered by the analysis, leaving a total of 87 agencies in the analysis.

Individual episodes were excluded if Medicare was not the primary payer for the patient (1,386 episodes) or the patient was in an HMO at some time during the home health episode (1,196 episodes). Agencies were not supposed to receive per-episode payment for patients for whom Medicare was not the primary payer or for patients enrolled in HMOs. Agencies were probably not aware of these circumstances when they admitted the patient and submitted a claim to the demonstration FI.

Individual episodes were also excluded if data that were needed to construct dependent or control variables were missing (151 episodes).[4] In addition, we excluded 1,935 episodes for which the demonstration FI had inadvertently erased the patient characteristic data from the remarks section

[3]In this section we note the numbers of episodes that were excluded from the analysis for various reasons. Some episodes were excluded for multiple reasons, thus, the numbers presented do not sum to 5,902 (the difference between 51,314 and 57,216).

[4]Episodes for patients who did not have Medicare for a full six months before the start of home health were retained on the file even though claims data did not cover the full six months before home health admission. Lagged dependent variables and other claims-based control variables for such beneficiaries were set to the mean value for beneficiaries age 65.5 to 66 who did have Medicare for a full six months.

of the UB-92. The FI is working to restore the data but could not complete the task in time for this report.

C. SUMMARY STATISTICS FOR CONTROL VARIABLES

The treatment and control agencies and their patients differed significantly on a number of characteristics, underscoring the importance of controlling statistically for these differences in our impact estimates. When the number of units randomized is not large, as is the case here (91 agencies), random assignment cannot be relied upon to yield treatment and control groups that are identical at baseline. Furthermore, as noted above, three agencies dropped out of the demonstration, which also could have created differences between the two groups.

Table II.3 displays the treatment and control group means for beneficiary-specific variables used in regression models for the preliminary impact analyses. (Following the methodology described below in Section D, these means have been weighted to give each agency equal representation.)[5]

With the large sample of episodes used in this analysis, we have the statistical power to detect very small differences between the treatment and control groups at baseline. For example, for a binary indicator with a mean of 50 percent, the minimum detectable difference is 1.3 percentage points, using a two-tailed test with a 95 percent confidence interval, at 80 percent power. We therefore expect that many differences in the explanatory variables between the treatment and control agencies will be statistically significant even when the magnitude of the difference is not large.

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[5]The significance levels for the tests of equality between treatment and control group means in Table II.3, 4, and 5 do not account for design effects due to the clustering. In describing the analysis sample (but not in the main analysis described in Chapter III), there is no need to account for these effects because we are interested only in differences within this sample, not within the population of all agencies. We do account for the design effects associated with our use of sample weights, however. See Section D of this chapter for a complete discussion of the use of weighting and clustering in our analysis.

TABLE II.3

WEIGHTED MEANS FOR STANDARD BENEFICIARY-SPECIFIC CONTROL VARIABLES, BY TREATMENT STATUS
(Percentages, Unless Otherwise Noted)

	Treatment Group	Control Group
Age		
Younger than 65	7.9	9.0**
75 to 84	39.7	40.0
85 or older	23.5	21.7**
Female	63.3	64.4
White	80.9	81.1
Original Reason for Medicare: Old Age	83.3	81.4***
Medical Conditions		
Cancer	12.7	12.8
Diabetes	21.6	21.7
Cerebrovascular accident (stroke)	15.3	14.7
Decubiti stage 3 or 4	4.6	3.7***
Need for Complicated Wound Care[a]	7.0	7.0
Functional Limitations[b]		
Bathing	71.8	72.7
Eating	28.4	30.2**
Dressing	60.4	64.6***
Toileting	38.1	40.7***
Transferring	49.7	52.2***
Preadmission Location: Hospital	35.2	37.9***
Had Medicare for Less than Six Months	1.4	1.4
Length of Hospital Stay During Two Weeks Before Home Health (days)[c]	3.6	4.2***

TABLE II.3 *(continued)*

	Treatment Group	Control Group
Any Skilled Nursing Facility Stay During Two Weeks Before Home Health	17.4	15.4***
Total Medicare Part A Reimbursement During Six Months Before Home Health (in Thousands of Dollars)[d]	11.4	11.4
Number of Episodes	26,282	25,032

SOURCE: Medicare Enrollment Files and demonstration-specific fields from UB-92 forms.

[a]Patient has wound that requires soaking, irrigation, or debridement.

[b]Patient requires some human assistance with or does not participate in activity.

[c]If patient was not hospitalized withing the two weeks before home health, days are set to zero.

[d] Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

Demographics. Among patients served by treatment and control agencies, just over a fifth were age 85 or older, nearly two-thirds were female, most (80 percent) were white, and most (over 80 percent) were entitled to Medicare because of age (rather than disability). Some of the demographic characteristics of patients admitted to treatment and control agencies differed significantly, but the magnitudes of the differences were not large. Relative to control agencies, treatment agencies served a slightly higher proportion of patients age 85 and older and a slightly higher proportion of patients originally entitled to Medicare because of age.

Medical Conditions and Care Need. Between 13 and 22 percent of patients had cancer or diabetes or had suffered a stroke at or just before home health admission. Under five percent had serious decubitus ulcers. However, a higher proportion of treatment agency patients had serious decubitus ulcers (24 percent more than did control agency patients). Seven percent of patients of both types of agencies needed complicated wound care (that is, soaking, irrigation, or debridement).

Limitations in Activities of Daily Living. More than 60 percent of patients of both types of agencies required human assistance dressing or bathing, while roughly 40 to 50 percent required assistance with toileting and transferring and about 30 percent required assistance with eating. Relative to control agencies, treatment agencies served patients less likely to require human assistance with daily living activities, but the magnitudes of the differences are quite small. For four of the five activities (eating, dressing, toileting, and transferring), treatment agencies had significantly smaller proportions of patients who required assistance than control agencies. However, these treatment-control differences are less than 10 percent of the control group mean.

Prior Service Use. Just over a third of all patients from treatment and control agencies had been admitted to home health directly from the hospital, and just under a fifth had been in a skilled nursing facility during the two weeks before home health admission. Patients served by treatment

and control agencies differed somewhat in severity of illness, as reflected in their use of medical services during the two weeks before entering home health. Treatment agencies were more likely to serve patients who had been recently discharged from a skilled nursing facility but less likely to serve those who had been recently discharged from a hospital. Thus, treatment agencies are less likely to serve patients with pressing posthospital care needs, but more likely to serve patients who have already received a spell of nursing care or rehabilitation in a nursing home. However, these differences are not large.

Lagged Medicare Service Use and Reimbursement. Regression models for the analysis of per-episode impacts on Medicare service use and reimbursement also included lagged values of dependent variables measured over the six months before home health admission. (Means of these lagged variables, by treatment status, appear in Table II.4.) Statistically significant differences between patients of treatment and control agencies in hospital and nursing home use reflect those just noted for the two weeks before home health admission. Other statistically significant differences were relatively small (for example, differences in the receipt of home health care from nondemonstration agencies and in the use of physician and other part B services).

In general, the means paint a picture of beneficiaries with a high level of service use in the months leading up to home health admission, as would be expected for beneficiaries sick and impaired enough to qualify for the Medicare home health benefit. Nearly two-thirds were hospitalized at some time during the six months before home health (even though only about a third had been admitted to home health directly from the hospital). More than a fifth had spent some time in a skilled nursing facility, and roughly 15 percent had received home health care from a nondemonstration agency during the six months. (About 10 percent had received home health from a demonstration agency during the period; this figure is not in the table.) Use of emergency room

TABLE II.4

WEIGHTED MEANS FOR LAGGED DEPENDENT VARIABLES, BY TREATMENT STATUS
(Measured over the Six Months Before Home Health Start)

	Treatment Group	Control Group
Inpatient Hospital Services		
Any admission (percentage)	62.7	64.9***
Number of admissions	0.95	1.02***
Number of days	8.5	9.3***
Reimbursement (dollars)[a]	8,543	8,479
Emergency Room Services		
Any inpatient admission with emergency room revenue center (percentage)	37.7	38.6
Number of inpatient admissions with emergency room revenue center	0.48	0.50*
Any outpatient emergency room visits (percentage)	25.4	26.1
Number of outpatient emergency room visits	0.39	0.39
Total number of emergency room encounters	0.87	0.90
Skilled Nursing Facility		
Any admission (percentage)	23.4	21.3***
Number of admissions	0.29	0.27**
Number of days	6.5	6.0
Reimbursement (dollars)[a]	1,952	1,903
Hospice		
Any admission (percentage)	0.2	0.2
Number of days	0.3	0.1
Reimbursement (dollars)[a]	28	14
Nondemonstration Home Health[b]		
Any admission (percentage)	16.3	14.9**
Number of visits	8.90	8.57
Reimbursement (dollars)[a]	622	582
Outpatient Hospital Services[c]		
Any visits (percentage)	67.8	69.3*
Number of visits	2.87	2.84
Reimbursement (dollars)	649	643

TABLE II.4 *(continued)*

	Treatment Group	Control Group
Physician and Other Practitioners		
Any visits (percentage)	93.6	95.3***
Reimbursement (dollars)	1,816	1,890*
Durable Medical Equipment		
Any purchases (percentage)	41.9	40.9
Reimbursement (dollars)	268	252
Other Part B Services[d]		
Any use	89.3	90.8***
Reimbursement (dollars)	553	516**
Total Reimbursement (dollars)		
Medicare Part A[e]	11,395	11,359
Medicare Part B	3,286	3,301
Total[f]	14,670	14,614
Number of Episodes	26,282	25,032

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

[a]Reimbursement is composed primarily of payments under Medicare Part A but also includes a small number of payments for services under Medicare Part B.

[b]Home health services provided by an agency other than the treatment or control agency that originally provided the identifying home health admission.

[c]Includes both emergency and nonemergency visits to outpatient hospitals.

[d]Includes diagnostic laboratory and radiology services (including pathologist and radiologist services), supplies and devices, mammography, ambulance, covered medications, blood, and vaccines.

[e]Excludes reimbursement for home health services provided by demonstration agencies. Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

[f]Excludes reimbursement for home health services provided by demonstration agencies.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

services was also high: just over a third had an emergency room visit that resulted in an inpatient admission, while a quarter had visits that did not. Forty percent had durable medical equipment purchases. Almost all had seen their physicians or other practitioners, and 90 percent had reimbursements for "other" part B services (which are dominated by diagnostic laboratory and radiology). As a result, mean Medicare reimbursement for the *six months* prior to home health was just under $15,000 for patients in our analysis sample, as compared with an *annual* average of $4,200 for all beneficiaries in 1995 (Health Care Financing Administration 1997).

Agency Characteristics. There are several significant differences in the characteristics of treatment and control agencies (see Table II.5). While the proportion of treatment agencies that are proprietary (48 percent) is significantly less than that of control agencies (51 percent), this difference is not large. On the other hand, we do observe large and statistically significant differences in the proportions of treatment and control agencies that are hospital-based, that are chain members, or that are relatively small in terms of visits provided in the base year. Only 9 percent of treatment agencies were hospital-based, compared with 15 percent of control agencies. Thirty-seven percent of treatment agencies were chain members, compared with 27 percent of control agencies. And 35 percent of treatment agencies were small (that is, provided fewer than 30,000 visits in their base year), compared with 20 percent of control agencies, a difference of 78 percent.

We also observe a statistically significant difference between treatment and control agencies in practice patterns prior to the demonstration. On average, the practice pattern index is about 15 percent lower for treatment group than for control group agencies, suggesting that even before the demonstration, treatment agencies tended to provide fewer visits than control agencies to roughly similar patients.

TABLE II.5

WEIGHTED MEANS FOR STANDARD AGENCY- AND AREA-SPECIFIC CONTROL VARIABLES, BY TREATMENT STATUS
(Percentages, Unless Otherwise Noted)

	Treatment Group	Control Group
Base Year Ratio of Mean Agency Visits to Mean for All Demonstration Agencies (Case Mix Adjusted)	0.93	1.10***
Hospital-Based Agency	8.7	14.6***
For-Profit Agency	47.8	51.2***
Chain Member	37.0	26.8***
Agency Provided Fewer than 30,000 Visits in Base Year	34.8	19.5***
Agency Located in Urban Area	84.8	85.4
State		
Florida	8.7	9.8**
Illinois	13.0	22.0***
Massachusetts	17.4	7.3***
Texas	34.8	39.0***
County-Level Means		
Number of nursing home beds per 100 persons over age 65	5.08	5.16*
Number of physicians per 10,000 persons	22.00	21.48***
Hospital occupancy rate	0.62	0.61***
Medicare reimbursement per beneficiary (in thousands of dollars)	3.413	3.406
Number of Episodes	26,282	25,032

SOURCE: Medicare Cost Reports; Area Resource File.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

Area Characteristics. The distribution of treatment and control agencies across states differs, with a higher prevalence of treatment group agencies in Massachusetts (17 percent, compared with 7 percent of control agencies) but a lower prevalence in Illinois (13 percent, compared with 22 percent of control agencies). Significant differences also existed between the service environments of the counties in which treatment and control agencies were located. There were significant differences in physician supply and hospital occupancy rate; however, both of these differences were small.

In summary, while the preexisting treatment-control differences in patient characteristics are minimal, there are several large differences in agency characteristics and in the distribution of agencies across states. If these differences affect the provision of home health services, we would incorrectly estimate the effects of per-episode payment if we were simply to compare treatment and control group means. In fact, the magnitude of these differences suggests that a comparison of treatment and control group means would be very misleading. Because regression models allow us to control for these preexisting differences, they ought to provide more accurate estimates of the effect of the demonstration payment method.

D. STATISTICAL METHODOLOGY

To assess the preliminary impact of prospective payment, we estimate regression models for all episodes occurring in treatment and control agencies during the initial period of the demonstration. The models predict the use of and reimbursement for Medicare-covered services as a function of whether a patient is being served by a treatment or by a control agency, the patient's personal characteristics, and the characteristics of the agency and the area. The estimated impact of the payment method is given by the regression-adjusted difference in means between patients of treatment and control agencies. We use regression-adjusted differences because they improve the

precision of the estimated effects and control for the preexisting treatment-control differences just discussed.

We use three types of weighted regression models. For our main findings, we estimate impacts using ordinary least squares (OLS) regression when the dependent variable is continuous and logistic regression when the dependent variable is binary. As part of the sensitivity analysis, we also estimate impacts using Tobit regression models when the dependent variable is continuous but has been censored at a discrete value (for example, reimbursement for inpatient services) or ordered logit when the dependent variable is categorical (for example, number of inpatient admissions). The main regression models use weighted data so that each agency is given equal representation in the analysis; however, we also examine the robustness of our results with respect to alternative sample weights. Standard errors are estimated with software (SUDAAN) that accounts for the effects of sample clustering and weighting, as described below.

1. Statistical Models for Estimating Overall Impacts

When the outcome that we investigate is continuous (for example, total Medicare reimbursement during the risk period) the basic model that we use to estimate the overall impacts of prospective payment is

$$(1) \quad Y = \alpha + X\beta + \delta T + \epsilon,$$

where

Y is a continuous outcome variable measured during the 120-day risk period

X is a vector of control variables

T is a binary variable for treatment status that equals 1 for episodes rendered by treatment agencies and 0 for episodes rendered by control agencies

α is the intercept term

β is the vector of regression coefficients on the control variables

δ is a parameter that measures the impact of prospective rate setting on the outcome Y

ϵ is a random disturbance term assumed to have a mean of zero (conditional on X and T) that reflects all the unobserved factors affecting Y

The coefficient δ on the variable T measures the effect of the demonstration payment method on the (continuous) outcome of interest and is tested to determine whether it is significantly different from zero. For the main analysis, we use OLS to estimate this equation; however, as a sensitivity test for a few key censored dependent variables, we also investigate impacts using Tobit models, and for a few key categorical dependent variables, we will use ordered logit models (see Section 5).

When the outcome variable that we investigate is binary (for example, whether the patient was admitted to the hospital during the risk period), a logit model is used to estimate demonstration impacts. The structure of the logit model is as follows:

$$(2) \quad Probability\ (Y=1) = \frac{1}{1 + e^{(\alpha + X\beta + \delta T)}},$$

where Y is the (binary) outcome variable and the remaining variables and parameters are defined as in equation (1).

Given the nonlinearity of the logit model, the estimated impact of the payment method is not measured directly by the coefficients δ on the variable for treatment status. To estimate the demonstration impact on the probability that $Y = 1$, we use the coefficient estimates from the model to generate two predicted probabilities for each observation: one assuming that the observation

belongs to the treatment group ($T = 1$), and one assuming that it belongs to the control group ($T = 0$). The impact estimate is the average difference between these estimated probabilities. Because the statistical significance of δ determines whether the odds that $Y = 1$ are significantly different for the treatment and control groups, we use the p-value on this parameter to test our hypotheses about differences between the two groups.

Throughout the tables of results, alongside the estimated impact we present, as a point of reference, the unadjusted mean of each outcome variable for the control group. The control group mean for the outcome variable is a reasonable estimate of the mean value of the outcome that would be observed in the absence of the demonstration. We use this mean to assess the relative magnitude and importance of the estimated impact.

2. Hypothesis Tests for the Impact Estimates

For each outcome, a two-tailed t-statistic tests the null hypothesis that there is no difference between the regression-adjusted means for treatment and control agencies. The associated p-value is used to determine whether the demonstration had a measurable impact. The p-value is based on estimated standard errors that account for the clustering of episodes within agencies and the use of sample weights. A p-value below 0.10 indicates rejection of the null hypothesis and provides significant statistical evidence that a demonstration impact exists. At this p-value, however, approximately 10 percent of independent tests will show, simply by chance, a statistically significant treatment-control difference when there is no true program effect (known as Type I error). Therefore, in assessing whether a statistically significant treatment-control difference, especially one with a p-value between .05 and .10, should be interpreted as a true program impact, we consider whether the sign and magnitude of the predicted effect are consistent with those for related outcomes.

Despite our large sample of patient episodes, it is unlikely that we will be able to detect small program impacts, because design effects greatly reduce the precision of our estimates. For example, ignoring the design effects associated with our weighted sample and the clustering of episodes within agencies, the minimum detectable effect of the demonstration on Medicare Part A reimbursement is 5.6 percent under a two-tailed test at the 10 percent significance level, with 80 percent power. After design effects are accounted for, however, the minimum detectable effects are about 11 percent. Thus, despite our large sample size, it is unlikely that we would detect the effects of prospective payment on outcomes unless they were at least moderate in size.

3. Weighting

As noted previously, we weight the episodes in the main regression analysis to give agencies equal representation in the analysis. We use this approach for two reasons. First, because the demonstration is implemented at the agency level (not the episode level), the agency is the behavioral unit of interest. Second, the use of weighted data ensures that the impact estimates will not be dominated by the experiences of a few large agencies.

For each agency i, we construct the "agency equal" weight as follows:

$$(4) \quad w_i = \frac{1/n_i}{k/n},$$

where n_i is the number of (episode-level) observations in agency i, k is the number of agencies, and n is the total number of observations for all agencies. The weights range from a high of 24.8 to a low of 0.14, with 75 percent of the agencies having weights between 7.1 and 0.5.

While we prefer this weighting approach, one potential drawback is that the overall impact estimates may be distorted if very large weight is placed on episodes in small agencies, which may include outliers. Therefore, in the sensitivity analysis, we also examine the impacts of the demonstration when giving each agency representation in the analysis that is equal to its relative size. Since all the agency's episodes during the demonstration are included in the analysis, this normally would be equivalent to conducting the analysis without sample weights; however, for this interim report, our sample includes home health episodes occurring over a different length of time for each agency.[6] Thus, in order to reflect the agencies' relative size accurately, we must scale each observation for an agency by the (relative) time that it had been in the demonstration as of the time admissions for the file were cut off (August 1996).

For each agency i, this "agency share" weight is given by

$$(5) \quad w_i^s = \frac{\bar{t}}{t_i},$$

where t_i is the length of time that agency i has been in the demonstration as of August 1996, and $\bar{t}$ is the average of the t_i's across agencies (approximately 10 months).

4. Design Effects

For appropriate inferences to be drawn about the expected effects of a national prospective payment program, our estimated standard errors must reflect the fact that our episode observations are clustered in a small number of agencies. The variances of the impact estimates generated from

[6]We currently have data over varying time intervals because agencies entered the demonstration at the start of their fiscal year, which differs by agency. Only episodes beginning on or before August 31, 1996, are included in the analysis. For the final report, we will have two years of data on all agencies.

standard statistical packages treat observations as though they were drawn as a random sample from an infinite population of episodes.[7] They do not, however, account for the fact that we have drawn all our observations from a (self-selected) sample of agencies.

To correct for possible nonindependence of observations within agencies, we use SUDAAN software to obtain the appropriate standard errors for our impact estimates. The SUDAAN calculations also account for the greater variance introduced by using sample weights in the regression models.

5. Robustness Checks

While we expect the regression models used in the main analysis to be robust, they may be sensitive to two important factors. First, as noted previously, the use of sample weights that equate agencies' representation in the data may give small agencies undue influence in the analysis. Second, the censoring of continuous dependent variables at a discrete value or the categorical nature of dependent variables may introduce statistical bias into the OLS models.

Alternative Sample Weighting. To investigate the sensitivity of our results to the weighting approach, we examine the impacts of prospective payment on key outcomes by using the "share of episode" weights described previously. To the extent that the impact estimates are similar under the two approaches, it strongly suggests that our results are not overly influenced by a small number of anomalous observations from agencies providing few episodes. Thus, the results may be more broadly interpreted for policy purposes. Conversely, while dissimilar results under the two sample

[7]Our sample actually includes the population of patient episodes taking place in demonstration agencies over the early demonstration period. However, because we wish to make inferences about the outcomes for patients admitted in other times and to other agencies, we treat episodes in the data as though they were drawn in a simple random sample from the pool of all (future) episodes in all agencies.

weights do not necessarily indicate that the main results are "incorrect," they do suggest that further assessment is required to determine the most valid influences for policy.

We ran all regression models with both sets of weights and generally found no differences in impact estimates. The tables in Chapter III present findings using weights that give agencies equal representation. We note the small number of differences in impact estimates with the two weighting schemes in the text of Chapter III.

Censoring of the Dependent Variable. The Tobit model will be used to obtain consistent estimates of impacts on outcomes where the dependent variable has been censored at a particular value.[8] By comparing the results from these models with those obtained from OLS regressions, we determine the potential sensitivity of our main findings to the effects of censoring. Variables may be censored from the left, right, or both sides. In the analysis of impacts on Medicare service use and reimbursement, we are concerned primarily with variables that are censored on the left at a value of zero (for example, reimbursement for inpatient stays).

The Tobit model for our left-censored dependent variables (for example, inpatient reimbursement) assumes that an unobserved, underlying index of the need for services exists. If this index (Y^*) exceeds some threshold (zero in our specification), then the patient receives the needed amount of the services; if the index is less than the threshold, the patient receives no care of that type. The model therefore consists of a probabilistic component for the likelihood of needing a particular type of service, and a linear component for the expected reimbursement for that service, conditional on having a need for services above the threshold:

---

[8] The consistency of the Tobit model rests on very strong statistical assumptions, and violation of these assumptions may lead to substantial bias in the estimated impacts. Therefore, we prefer to use this model only as a sensitivity test and rely on more robust OLS models for the main findings.

(8) $Y^* = \alpha + XB + \delta T + \epsilon$
$Y = Y^* \text{ if } Y^* > 0$
$Y = 0 \text{ if } Y^* \leq 0$

where the variables and parameters are the same as in equation (1).

After the parameters of the Tobit model have been estimated, they are used to obtain predictions of the expected value of the given outcome for each observation. This expected value is given by the product of the predicted probability that a patient uses a given service and the predicted amount of the service used, conditional on its being greater than zero. These predicted values are calculated twice: once assigning a given observation to the control group, and once assigning it to the treatment group. The mean difference between these two predicted values is our estimate of the impact of the demonstration on a given outcome.

We used Tobit models to estimate program impacts on a few key variables (inpatient reimbursement, skilled nursing facility reimbursement, and Medicare total Part A reimbursement) and found no differences between impacts estimated with Tobit and those estimated with OLS.

Categorical variables. Two of the variables in our analysis, the number of hospital admissions and the number of emergency room visits, are categorical or count variables, which take a limited number of possible values (a maximum of 12 for the former and 22 for the latter). For variables such as this, regression analysis is not strictly appropriate. However, no software exists that accounts for the effects of clustering and weighting on the standard errors of impact estimates from more-appropriate statistical models.

We rely on OLS regression to obtain our impact estimates but test the sensitivity of our results to this model misspecification by estimating ordered logit models for these outcomes. Ordered logit models are similar to binary logit models (described earlier) but include separate (and progressively

larger) intercept terms α_i for the probability that $Y \leq i$. Thus, the predicted probability that $Y = i$, for $i > 0$, is equal to the probability that $Y \leq i$ minus the probability that $Y \leq (i - 1)$.

The statistical significance of the coefficient on T in the estimated models indicates whether prospective payment affects the number of visits or admissions that patients receive. The size of the impact must be calculated in the same way as the impact estimate from the binary logit models and Tobit models--by obtaining the predicted values for the expected value of Y for each observation in the sample, first treating them as a treatment group member and then as a control group member, and then averaging the difference in these two estimates across all sample members. The expected value of the outcome variable is calculated as $\sum_i i * predicted\ probability\ (Y = i)$.

We found no differences between impacts on number of hospital admissions and on number of emergency room encounters estimated with ordered logit and those estimated with OLS.

III. IMPACTS ON THE USE OF AND REIMBURSEMENT FOR MEDICARE-COVERED SERVICES

Although preliminary analysis suggests that per-episode payment markedly reduced the number of visits home health agencies provided during the first 120 days after admission, it did not affect the use of or reimbursement for other Medicare-covered services. Reduction in home health visits could have reduced care quality or caused a shift in care to other settings. (Figure III.1 presents an overview of how per-episode payment might increase the use of and reimbursement for other Medicare-covered services.) This absence of an increase the use of other Medicare-covered services suggests that a reduction in home health use at the level observed under the demonstration does not adversely affect care quality or shift costs to services in other settings.

For ease of explication, we refer to observations in this analysis as patients, though observations were in fact home health episodes. Only three percent of the more than 50,000 patients in the sample used for this analysis, however, had more than one episode during the period covered by the analysis.

A. INPATIENT AND EMERGENCY ROOM SERVICES

A key concern about the implementation of per-episode payment was that the quality of home health care might suffer as a result of financial incentives to reduce the number of visits provided or the cost of providing visits. The most serious adverse effects on quality would be reflected in increases in hospital and emergency room use and would increase the overall costs to Medicare. The findings of this preliminary analysis suggest, however, that the quality of care was not affected.

Patients of treatment and control group agencies had nearly identical levels of inpatient service use during the 120 days following home health admission. (See Table III.1.) Just under a third had an inpatient admission, and patients spent an average of roughly four days in the hospital. Medicare

FIGURE III.1

HOW PER-EPISODE PAYMENT MIGHT INCREASE OVERALL MEDICARE SPENDING

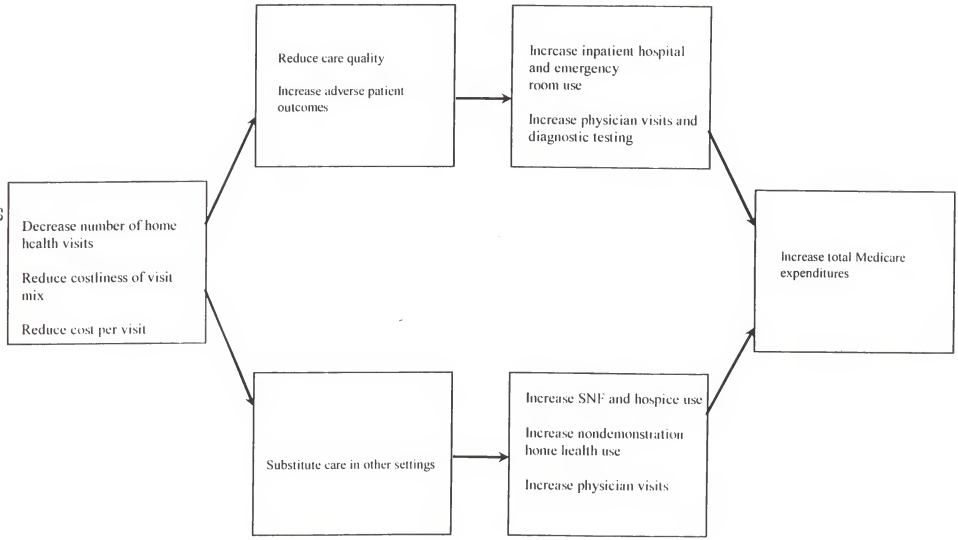

TABLE III.1

ESTIMATED DIFFERENCES BETWEEN PER-EPISODE PAYMENT AND COST REIMBURSEMENT IN INPATIENT HOSPITAL USE AND REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

	Control Group Mean	Difference (P-value)[a]	Difference as Percent of Control Mean
Whether Any Admission (Percentage)	31.7	-0.4 (0.70)	-1.3
Number of Admissions	0.48	0.00 (0.99)	0.0
Number of Days	3.9	0.0 (0.86)	0.0
Reimbursement (Dollars)[b]	3,512	46 (0.78)	1.3
Number of Episodes	--		--
Treatment		**26,282**	
Control		**25,032**	

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

NOTE: The difference presented for "any admission" was estimated using a logit model; other differences were estimated using ordinary least squares (OLS). "Differences" are the average difference between the expected value for all observations if they were patients of treatment group agencies and the expected value for all observations if they were patients of control group agencies. (For the OLS results, this difference is the coefficient on the treatment status indicator.) (See Appendix Table A.1 for estimated coefficients on all control variables for "number of admissions.") Episodes were weighted so that each agency is represented equally.

[a]The p-values (tests that the coefficients on treatment status in the models were significantly different from zero) were based on estimated standard errors that account for the effects of clustering and weighting.

[b]Reimbursement is composed primarily of payments under Medicare Part A but also includes a small number of payments for inpatient services under Medicare Part B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

reimbursement for inpatient services during this period was about $3,500, or just under $900 per month. This level of reimbursement is substantially higher than the level for Medicare beneficiaries overall, which reflects the poorer health of home health patients. In 1995, inpatient reimbursement for a typical beneficiary was only about $185 per month (Health Care Financing Administration 1997).

Patients of treatment and control agencies also had similar levels of emergency room use during the 120 days following home health admission. (See Table III.2.) Medicare claims allowed us to identify both inpatient admissions that started with emergency room services and outpatient emergency room visits. (Reimbursement for emergency room services was not distinguishable from other reimbursements for inpatient or outpatient services included on emergency room claims.) About a fifth of all patients had an emergency room visit that resulted in an inpatient admission. And about a fifth of all patients had an outpatient emergency room visit. The number of total emergency room contacts--inpatient and outpatient--was 0.5, on average.

We conclude that the reduction in home health visits (and any other changes) brought about by per-episode payment did not result in any increased use of inpatient and emergency services.

B. SKILLED NURSING FACILITY AND HOSPICE SERVICES

Even if per-episode payment did not adversely affect care quality, it might have caused care to be shifted from home health to some other setting, like a nursing home or hospice, particularly if a home health agency viewed a patient as particularly costly to serve. However, our preliminary analysis suggests this was not the case.

We found no evidence that care in skilled nursing facilities (SNFs) was substituting for the observed reduction in home health visits. (See Table III.3.) Roughly 10 percent of treatment and control agency patients had a SNF stay during the 120 days following home health admission, and

TABLE III.2

ESTIMATED DIFFERENCES BETWEEN PER-EPISODE PAYMENT AND COST REIMBURSEMENT IN EMERGENCY ROOM USE AND REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

	Control Group Mean	Difference (P-value)[a]	Difference as Percent of Control Mean
Whether Any Inpatient Admission with Emergency Room Revenue Center (Percentage)	20.9	-0.8 (0.28)	-3.8
Number of Inpatient Admissions with Emergency Room Revenue Center	0.27	-0.01 (0.48)	-3.7
Whether Any Outpatient Emergency Room Visit (Percentage)	18.9	-0.6 (0.55)	-3.2
Number of Outpatient Emergency Room Visits	0.27	-0.01 (0.77)	-3.7
Whether Any Emergency Room Encounters (Percentage)	33.9	-1.1 (0.35)	-3.2
Total Number of Emergency Room Encounters	0.54	-0.01 (0.63)	-1.9
Number of Episodes	--		--
Treatment		**26,282**	
Control		**25,032**	

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

NOTE: The differences presented for "any admission" and "any visit" were estimated using logit models; other differences were estimated using ordinary least squares (OLS). "Differences" are the average difference between the expected value for all observations if they were patients of treatment group agencies and the expected value for all observations if they were patients of control group agencies. (For the OLS results, this difference is the coefficient on the treatment status indicator.) (See Appendix Table A.1 for estimated coefficients on all control variables for "number of emergency room encounters.") Episodes were weighted so that each agency is represented equally.

[a]The p-values (tests that the coefficients on treatment status in the models were significantly different from zero) were based on estimated standard errors that account for the effects of clustering and weighting.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE III.3

ESTIMATED DIFFERENCE BETWEEN PER-EPISODE PAYMENT AND COST REIMBURSEMENT IN SKILLED NURSING FACILITY AND HOSPICE USE AND REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

	Control Group Mean	Difference (P-value)[a]	Difference as Percent of Control Mean
Skilled Nursing Facility			
Whether Any Admission (Percentage)	9.8	0.2 (0.77)	2.0
Number of Admissions	.12	-0.00 (0.89)	-0.0
Number of Days	2.4	-0.0 (0.99)	-0.0
Reimbursement (Dollars)[b]	730	-48 (0.48)	-6.6
Hospice			
Whether Any Admission (Percentage)	2.7	-0.3 (0.35)	-11.1
Number of Days	0.6	0.1 (0.39)	16.7
Reimbursement (Dollars)[b]	74	8 (0.53)	10.8
Number of Episodes	--		—
Treatment		**26,282**	
Control		**25,032**	

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

NOTE: The differences presented for "any admission" were estimated using logit models; other differences were estimated using ordinary least squares (OLS). "Differences" are the average difference between the expected value for all observations if they were patients of treatment group agencies and the expected value for all observations if they were patients of control group agencies. (For the OLS results, this difference is the coefficient on the treatment status indicator.) (See Appendix Table A.2 for estimated coefficients on all control variables for "any skilled nursing facility admission.") Episodes were weighted so that each agency is represented equally.

TABLE III.3 *(continued)*

[a]The p-values (tests that the coefficients on treatment status in the models were significantly different from zero) were based on estimated standard errors that account for the effects of clustering and weighting.

[b]Reimbursements are composed primarily of payments under Medicare Part A but also include a small number of payments for skilled nursing facility and hospice services under Medicare Part B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

they spent about two and a half days, on average, in a SNF. Average reimbursement for the period was $730, or about $180 per month. In 1995, SNF reimbursement was about $19 per month for the typical Medicare beneficiary, which once again reflects the poorer health of home health patients (Health Care Financing Administration 1997).

We also found no evidence that reductions in home health visits shifted care to hospice programs. Under three percent of treatment and control agency patients used hospice services during the 120 days following home health admission.

C. NONDEMONSTRATION HOME HEALTH SERVICES AND PART B HOME HEALTH

A number of events could lead a patient of a treatment group home health agency to receive services from another agency during the 120-day period covered by the per-episode payment. Some of these events are not related to the demonstration and thus should be equally likely to occur to patients of control agencies. For example, it sometimes happens that hospital-based home health agencies will provide services to patients requiring home health care following hospitalization, even if the patient had been in the care of another agency before the hospitalization. People who were vacationing in one area of the country when they became ill and were admitted to a demonstration agency might return home and begin receiving care from another agency. (This seems particularly likely for demonstration agencies located in the sun belt.) In other cases, agencies that do not provide the full spectrum of home health services might share a patient with another agency that provides needed services (like medical social services or occupational therapy).

However, the earlier discharge of patients by treatment agencies, a clear incentive under per-episode payment, is an event that may lead to the increased use of home health services provided by other agencies. In fact, Cheh et al. (1997) found that treatment agencies discharged patients an

average of 10 days sooner during the 120-day period than did control agencies. However, earlier discharge (and subsequent use of other home health services) may reflect either better or poorer care from treatment agencies. Early discharge would reflect better care if it resulted from more efficient patient teaching and better coordination with community services. (Alternatively, the care provided may be of comparable quality but limited to what is truly necessary.) Nonetheless, patients may become accustomed to receiving home health care and, in a highly competitive home health market, may be able to find other home health agencies to provide services--even those no longer strictly necessary. On the other hand, if treatment agencies discharged patients inappropriately early, the use of other home health care would reflect poorer care. All these events--those induced by per-episode payment reflecting better or worse care, as well as those external to the demonstration--are reflected in our measures of home health provided to demonstration patients by nondemonstration agencies.

Treatment/control differences in the receipt of and reimbursement for services from home health agencies other than those in the demonstration were small and not statistically significant at the five percent level. (See Table III.4.) A small but nontrivial proportion of control agency patients (eight percent) received home health services from an agency other than their demonstration agency during the 120 days following a demonstration agency admission. A slightly higher proportion of treatment agency patients (nine percent) also received home health care from a nondemonstration agency. However, this difference was statistically significant at only the 10 percent level, and treatment and control agency patients received similar numbers of visits from nondemonstration agencies (between three and four) and had similar levels of reimbursement for those visits (about $250).

TABLE III.4

ESTIMATED DIFFERENCE BETWEEN PER-EPISODE PAYMENT AND COST REIMBURSEMENT IN NONDEMONSTRATION HOME HEALTH USE AND REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

	Control Group Mean	Difference (P-value)[a]	Difference as Percent of Control Mean
Whether Any Admission (Percentage)[b]	7.9	1.2* (0.08)	15.2
Number of Visits[b]	3.3	0.4 (0.40)	12.1
Reimbursement (Dollars)[b]	242	33 (0.36)	13.6
Number of Episodes	--		--
Treatment		**26,282**	
Control		**25,032**	

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

NOTE: The difference presented for "any admission" was estimated using a logit model; other differences were estimated using ordinary least squares (OLS). "Differences" are the average difference between the expected value for all observations if they were patients of treatment group agencies and the expected value for all observations if they were patients of control group agencies. (For the OLS results, this difference is the coefficient on the treatment status indicator.) (See Appendix Table A.2 for estimated coefficients on all control variables for "any admission.") Episodes were weighted so that each agency is represented equally.

[a]The p-values (tests that the coefficients on treatment status in the models were significantly different from zero) were based on estimated standard errors that account for the effects of clustering and weighting.

[b]Outcomes are composed primarily of services and payments under Medicare Part A but also include a small number of services for home health reimbursed under Medicare Part B. Services reimbursed under Part B were all therapy visits.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

For two reasons, we do not believe the small difference in the proportion of patients receiving visits from nondemonstration agencies is evidence that treatment agencies discharge patients inappropriately early. First, the pattern of home health visits across demonstration and nondemonstration agencies *for patients who had visits from both types of agencies* does not suggest that agencies receiving per-episode payment are discharging patients prematurely, as illustrated below.

ESTIMATED DIFFERENCES FOR PATIENTS WHO RECEIVED VISITS FROM DEMONSTRATION AND NONDEMONSTRATION AGENCIES

	Control Group Mean	Impact Estimate (P-value)	Impact as Percent of Control Mean
Number of Visits			
Demonstration agency	26.2	-4.1 (0.24)	-15.7
Nondemonstration agency	39.5	-2.4 (0.53)	-6.1
All agencies	65.6	-6.2 (0.18)	-9.5
Number of Episodes			
Treatment		2,591	
Control		1,757	

We see that control group patients receiving services from both demonstration and nondemonstration agencies received, on average, a total of 66 visits and that 26 of those visits (40 percent) were provided by demonstration agencies. If treatment agencies were discharging patients inappropriately early, we would expect to see treatment group patients receiving more visits than control group patients from nondemonstration agencies. However, we observe a small and statistically

insignificant difference in the number of visits treatment and control patients receive from nondemonstration agencies. They each receive roughly 40 visits.

Second, the differences presented in Table III.4 seem to be particularly sensitive to one treatment group agency, with an unusually high proportion of patients receiving care from other agencies. As Table III.4 reflects, between eight and nine percent of patients, on average, received services from nondemonstration agencies during the 120 days following demonstration agency admission. This rate ranged from 2 to 17 percent for all the demonstration agencies except one very large treatment agency, which had a rate of 37 percent.[1] When episodes from this agency were removed from the analysis sample, the treatment/control difference in the proportion of patients receiving nondemonstration agency services was much smaller and was no longer statistically significant. Nevertheless, a small treatment/control difference in the proportion with nondemonstration home health services remained when agencies were represented in proportion to their size (even after excluding the one large agency for which 37 percent of patients had nondemonstration home health use), because more treatment group agencies had rates above 10 percent than did control agencies, and the treatment agencies with the highest rates tended to be quite large.

There was concern that agencies receiving per-episode payment would be more likely not only to discharge their patients prematurely, but also to shift services from Part A (included under their per-episode payments) to Part B coverage (not included under per-episode payment), to the extent possible. Shifting of services was merely a secondary concern because, under current regulations,

[1]Staff at this agency reported that the home health environment in their city was extremely competitive. They noted that hospitals routinely recruited the agency's patients for hospital-based agencies when the patients were hospitalized, and that other agencies inappropriately admitted patients this agency had discharged.

Part B home health coverage applies only to the relatively few beneficiaries who have just Part B coverage or to those with Part A who are in SNFs but have exceeded their lifetime SNF coverage limits and receive therapy services under Part B home health. In fact, less than half a percent of all patients received services from demonstration agencies paid under Part B, with no increase in use among patients of treatment agencies. (All Part B home health visits were for therapy, suggesting they were likely to have been provided to SNF patients.)

D. PART B SERVICES

Per-episode payment also had no effect on the use of Part B services. (See Table III.5.) Nearly two-thirds of patients from treatment and control agencies used outpatient hospital facilities, and average outpatient reimbursement was just over $500 for services delivered during the 120 days following home health admission. (In 1995, 61 percent of all Medicare beneficiaries had an outpatient hospital claim; these visits were primarily for diagnostic laboratory and radiology services, medical/surgical supplies, (ambulatory) operating room services, and services related to end-stage renal disease (Health Care Financing Administration 1997).)

Almost all patients (92 percent) visited their physicians (or other practitioners) during the 120 days following home health admission, and average reimbursement for these services was $900. Because physicians often order diagnostic tests when patients visit, in the first 120 days over 80 percent of patients used "other" Part B services, which are dominated by diagnostic laboratory and radiology services furnished by nonhospital providers but also include supplies and devices, mammography, ambulance, covered medications and vaccines, and blood. Average reimbursement for these services was about $300. Finally, nearly half of all patients (46 percent) received durable medical equipment (with an average reimbursement of just under $300) during the 120 days following home health admission.

TABLE III.5

ESTIMATED DIFFERENCE BETWEEN PER-EPISODE PAYMENT AND COST REIMBURSEMENT IN PART B SERVICE USE AND REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

	Control Group Mean	Difference (P-value)[a]	Difference as Percent of Control Mean
Outpatient Hospital[b]			
Whether Any Services (Percentage)	63.4	-0.2 (0.93)	-0.3
Reimbursement (Dollars)	508	-7 (0.78)	-1.4
Physician and Other Practitioners			
Whether Any Visit (Percentage)	91.7	-0.2 (0.64)	-0.2
Reimbursement (Dollars)	900	-5 (0.89)	-0.6
Durable Medical Equipment			
Whether Any Purchase (Percentage)	45.6	-0.0 (0.99)	-0.0
Reimbursement (Dollars)	290	-5 (0.80)	-1.7
Other Part B Services[c]			
Whether Any Use (Percentage)	82.3	-0.2 (0.84)	-0.2
Reimbursement (Dollars)	304	13 (0.36)	4.3
Number of Episodes	--		--
Treatment		**26,282**	
Control		**25,032**	

SOURCE: Medicare Standard Analytic Files 1995 to 1996.

TABLE III.5 *(continued)*

NOTE: The differences presented for "any admission," "any visit," "any purchase," and "any use" were estimated using logit models; other differences were estimated using ordinary least squares (OLS). "Differences" are the average difference between the expected value for all observations if they were patients of treatment group agencies and the expected value for all observations if they were patients of control group agencies. (For the OLS results, this difference is the coefficient on the treatment status indicator.) Episodes were weighted so that each agency is represented equally.

[a]The p-values (tests that the coefficients on treatment status in the models were significantly different from zero) were based on estimated standard errors that account for the effects of clustering and weighting.

[b]Includes both emergency and nonemergency visits to outpatient hospitals.

[c]Includes diagnostic laboratory and radiology services from nonhospital providers (including pathologist and radiologist services), supplies and devices, mammography, ambulance, covered medications, blood, and vaccines.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

E. TOTAL MEDICARE REIMBURSEMENT

Because per-episode payment had no effect on reimbursements for specific Medicare-covered services, it also had no effect on Part A, Part B, or overall Medicare reimbursement. (See Table III.6.) On average, patients of treatment and control agencies had Part A reimbursement (exclusive of home health from demonstration agencies) of about $4,600 and Part B reimbursement of $2,000 during the 120 days following home health admission, for a total of just under $6,600 (or about $1,650 per month).

We have not estimated differences in demonstration home health services in this analysis and thus have not included demonstration home health reimbursement in our totals. We did not estimate differences in the use of demonstration home health services, because they were the subject of another project report (Cheh et al. 1997). Estimates of the effect of per-episode payment on the *cost* of home health care (that is, the cost to the home health agency of providing care) will be the subject of a future report (Cheh forthcoming). Regression-adjusted estimates of the effect of per-episode payment on home health reimbursement--the cost of care to the Medicare program--are not informative, because reimbursement to treatment group agencies was set, by design, at predetermined levels based on agency reimbursement patterns during the year before the agency joined the demonstration. By contrast, control group payment was based on the number of visits provided to current patients. Thus, because the payment mechanisms for patients of treatment and control agencies were not comparable, estimating regression-adjusted impacts on home health reimbursement was not appropriate.

We note, however, that reimbursement for home health services provided by demonstration agencies during the first 120 days following admission averaged $3,067 for patients of control group agencies, as compared with $3,090 for patients of treatment group agencies. (The unadjusted

TABLE III.6

ESTIMATED DIFFERENCE BETWEEN PER-EPISODE PAYMENT AND COST REIMBURSEMENT IN TOTAL REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD
(Dollars)

	Control Group Mean	Difference (P-value)[a]	Difference as Percent of Control Mean
Total Medicare Part A Reimbursement[b]	4,557	66 (0.74)	1.4
Total Medicare Part B Reimbursement	2,002	-2 (0.97)	-0.1
Total Medicare Reimbursement[c]	6,560	29 (0.90)	0.4
Number of Episodes	--		--
Treatment		**26,282**	
Control		**25,032**	

SOURCE: Medicare Standard Analytic Files 1995 to 1996

NOTE: The differences presented in this table were estimated using ordinary least squares (OLS). "Differences" are the average difference between the expected value for all observations if they were patients of treatment group agencies and the expected value for all observations if they were patients of control group agencies. (For the OLS results, this difference is the coefficient on the treatment status indicator.) (See Appendix Table A.3 for estimated coefficients on all control variables for "Part A reimbursement" and "Part B reimbursement.") Episodes were weighted so that each agency is represented equally.

[a]The p-values (tests that the coefficients on treatment status in the models were significantly different from zero) were based on estimated standard errors that account for the effects of clustering and weighting.

[b]Excludes reimbursement for home health services provided by demonstration agencies. Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

[c]Excludes reimbursement for home health services provided by demonstration agencies.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

difference between these two amounts was not statistically significant.) Therefore, total Medicare spending during the 120-day risk period was just over $9,600, or about $2,400 per month.

F. CONCLUSION

Although per-episode payment appeared to lead to a substantial reduction in the number of home health visits provided by treatment group agencies, we found no evidence that it led to the substitution of care in other settings or adversely affected care quality, as reflected in the use of and reimbursement for other Medicare-covered services. These conclusions hold whether episodes were weighted to represent agencies equally or in proportion to their share of all episodes rendered by demonstration agencies. Nor are they sensitive to the statistical model used--alternative methods for estimating demonstration impacts led to similar conclusions. Moreover, these conclusions are consistent with those of the evaluation's preliminary analysis of demonstration impacts on care quality analysis that examines data from the demonstration's quality assurance contractor and data describing the use of Medicare services for specific home health admitting diagnoses (Chen forthcoming).

This preliminary analysis was restricted to Medicare-covered services during the 120 days following home health admission for home health episodes that occurred during approximately the first year of the demonstration. Although we observed no effects on service use in this analysis, it is possible that demonstration impacts may arise during the months following the initial 120-day risk period or in later demonstration years (as treatment group agencies gain more experience with prospective payment and potentially reduce visits further or make other changes). Service use in the post-risk period and in later demonstration years will be the focus of the evaluation's final impact analyses. In addition, while we detected no demonstration effects on the use of services overall, some offsetting effects may have existed for particular subgroups of patients or home health

agencies. Thus, we will also estimate demonstration effects on patient and agency subgroups as part of the final impact analysis.

While we are confident in concluding that, in its first year, the demonstration had no effect on Medicare service use and reimbursement during the risk period, caution should be exercised in generalizing these results to home health agencies not participating in the demonstration or to a national program of per-episode payment for the Medicare home health care. As in any study in which the participants are volunteers, demonstration agencies may be those best able to respond to the incentives of the demonstration. These agencies may be more concerned than others, on average, with the quality of care they deliver or better able to reduce visits without adversely affecting patients. The evaluation's final report will include an analysis of the representativeness of participating agencies.

Because a national program of per-episode payment would probably differ from the demonstration, the results may not precisely predict how agencies would behave and thus, how their patients would fare. Under a national program, agencies would not be protected from incurring financial losses, which could compel some to respond more aggressively to prospective payment. Furthermore, the per-episode rate paid to an agency would probably not be based on its own prior cost per episode, but on a regional or national average, greatly increasing the potential for losses for agencies that tend to provide large numbers of visits or have high costs. The financial pressure on agencies would be intensified if the rate is based on the episode cost of an "efficient" agency or if HCFA sets the per-episode payment at some percentage of the average national per-episode costs in order to share in any savings generated. Such additional financial pressures might cause agencies to reduce visits more than we observed in our preliminary analysis of the demonstration, which in turn may increase Medicare spending for other services. On the other hand, these pressures may be

offset by the commitment of agencies and staff to their patients, by competitive pressure to keep patients and referral sources happy, and by HCFA's quality review process.

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APPENDIX A

ESTIMATED COEFFICIENTS FOR KEY OUTCOMES

TABLE A.1

ESTIMATED COEFFICIENTS, NUMBER OF INPATIENT ADMISSIONS, AND NUMBER OF EMERGENCY ROOM CONTACTS DURING THE 120-DAY AT-RISK PERIOD

	Number of Inpatient Admissions (P-value)	Number of Emergency Room Encounters (P-value)
Intercept	0.23** (0.03)	0.14 (0.23)
Agency Received Prospective Payment	0.00 (0.99)	-0.01 (0.63)
Age		
Younger than 65	0.05* (0.09)	0.18*** (0.00)
75 to 84	0.02 (0.33)	0.04** (0.04)
85 or older	0.01 (0.81)	0.03 (0.18)
Female	-0.03** (0.02)	-0.04** (0.04)
White	0.01 (0.61)	0.00 (0.95)
Original Reason for Medicare: Old Age	-0.05 (0.05)**	-0.04* (0.06)
Medical Conditions		
Cancer	0.13*** (0.00)	0.08*** (0.00)
Diabetes	0.13*** (0.00)	0.12*** (0.00)
Cerebrovascular accident (stroke)	-0.01 (0.53)	0.01 (0.73)
Decubitti stage 3 or 4	0.09*** (0.01)	-0.02 (0.50)
Need for Complicated Wound Care[a]	-0.01 (0.71)	-0.07* (0.07)
Functional Limitations[b]		
Bathing	0.04* (0.06)	0.06*** (0.01)
Eating	0.06*** (0.01)	0.08*** (0.00)
Dressing	-0.01 (0.38)	-0.02 (0.30)
Toileting	0.03 (0.19)	-0.02 (0.40)

TABLE A.1 *(continued)*

	Number of Inpatient Admissions (P-value)	Number of Emergency Room Encounters (P-value)
Transferring	0.01 (0.60)	-0.00 (0.91)
Preadmission Location: Hospital	-0.05*** (0.01)	-0.02 (0.18)
Had Medicare for Less than Six Months	0.22*** (0.01)	0.10* (0.10)
Ratio of Mean Agency Visits to Mean for All Demonstration Agencies	0.05* (0.06)	0.03 (0.23)
Hospital-Based Agency	0.02 (0.46)	0.01 (0.82)
For-Profit Agency	0.01 (0.72)	0.03** (0.03)
Chain Member	-0.01 (0.79)	-0.01 (0.78)
Agency Provided Fewer than 30,000 Visits in Base Year	-0.01 (0.66)	-0.03 (0.32)
Agency Located in Urban Area	0.02 (0.46)	-0.02 (0.58)
Agency State		
Florida	-0.03* (0.10)	0.01 (0.56)
Illinois	0.01 (0.72)	-0.04* (0.10)
Massachusetts	0.02 (0.61)	0.04 (0.25)
Texas	-0.03 (0.17)	-0.02 (0.51)
County-Level Means		
Number of nursing home beds per 100 persons over age 65	-0.00 (0.38)	0.01** (0.05)
Number of physicians per 10,000 persons	-0.00 (0.70)	-0.00 (0.53)
Hospital occupancy rate	-0.04 (0.64)	0.18* (0.07)
Medicare reimbursement per beneficiary (in thousands of dollars)	0.00 (0.85)	-0.02 (0.43)
Length of Hospital Stay During Two Weeks Before Home Health (Days)[a]	-0.00 (0.91)	0.00 (0.81)
Any Skilled Nursing Facility Stay During Two Weeks Before Home Health	-0.09*** (0.00)	-0.08*** (0.00)
Total Medicare Part A Reimbursement During Six Months Before Home Health (In Thousands of Dollars)[a]	-0.00 (0.69)	0.00 (0.44)

TABLE A.1 *(continued)*

	Number of Inpatient Admissions (P-value)	Number of Emergency Room Encounters (P-value)
Lagged Value Dependent Variable (During Six Months Before Home Health Admission)	0.19*** (0.00)	0.28*** (0.00)
Number of Episodes	51,314	51,314

SOURCE: Medicare Standard Analytic Files 1993 to 1995

[a] Patient has wound that requires soaking, irrigation, or debridement.

[b] Patient requires some human assistance with or does not participate in activity.

[c] If patient was not hospitalized within theTwo weeks before home health, days are set to zero.

[d] Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE A.2

ESTIMATED COEFFICIENTS, ANY SKILLED NURSING FACILITY ADMISSION AND ANY OTHER HOME HEALTH ADMISSION DURING THE 120-DAY AT-RISK PERIOD

	Any Skilled Nursing Facility Admission (P-value)	Any Other Home Health Admission (P-value)
Intercept	-3.04*** (0.00)	-3.79*** (0.00)
Agency Received Prospective Payment	0.02 (0.77)	0.17* (0.08)
Age		
Younger than 65	-0.33** (0.05)	0.01 (0.97)
75 to 84	0.32*** (0.00)	0.16** (0.04)
85 or older	0.49*** (0.00)	0.23** (0.02)
Female	0.04 (0.48)	0.17** (0.03)
White	0.30*** (0.00)	0.00 (0.97)
Original Reason for Medicare: Old Age	-0.11 (0.36)	-0.16 (0.19)
Medical Conditions		
Cancer	0.13* (0.09)	0.14 (0.24)
Diabetes	0.16*** (0.01)	0.21*** (0.00)
Cerebrovascular accident (stroke)	0.10 (0.25)	0.04 (0.64)
Decubiti stage 3 or 4	0.34*** (0.01)	0.01 (0.91)
Need for Complicated Wound Care[a]	-0.02 (0.90)	0.10 (0.44)
Functional Limitations[a]		
Bathing	0.35*** (0.00)	0.08 (0.49)
Eating	0.10 (0.11)	-0.10 (0.36)
Dressing	0.08 (0.33)	0.27*** (0.01)
Toileting	0.11 (0.24)	-0.00 (0.98)

TABLE A 2 *(continued)*

	Any Skilled Nursing Facility Admission (P-value)	Any Other Home Health Admission (P-value)
Transferring	0 03 (0 74)	-0 02 (0 82)
Preadmission Location Hospital	-0 09 (0 16)	0 05 (0 62)
Had Medicare for Less than Six Months	-0 04 (0 85)	-0 17 (0 47)
Ratio of Mean Agency Visits to Mean for All Demonstration Agencies	0 02 (0 87)	0 45** (0 02)
Hospital-Based Agency	0 00 (0 97)	-0 24* (0 10)
For-Profit Agency	0 06 (0 44)	-0 01 (0 91)
Chain Member	-0 03 (0 69)	-0 14 (0 14)
Agency Provided Fewer than 30,000 Visits in Base Year	0 03 (0 73)	0 08 (0 44)
Agency Located in Urban Area	0 01 (0 92)	0 23 (0 20)
Agency State		
Florida	-0 29*** (0 01)	0 13 (0 43)
Illinois	-0 33** (0 02)	-0 57*** (0 00)
Massachusetts	0 03 (0 83)	-0 61*** (0 00)
Texas	-0 38*** (0 00)	-0 11 (0 45)
County-Level Means		
Number of nursing home beds per 100 persons over age 65	0 00 (0 93)	-0 05 (0 11)
Number of physicians per 10,000 persons	-0 00 (0 53)	0 00 (0 59)
Hospital occupancy rate	0 45 (0 21)	-1 07 (0 11)
Medicare reimbursement per beneficiary (in thousands of dollars)	-0 08 (0 48)	0 27 (0 13)
Length of Hospital Stay During Two Weeks Before Home Health (Days)†	-0 00 (0 81)	0 00 (0 39)
Any Skilled Nursing Facility Stay During Two Weeks Before Home Health	-0 22** (0 03)	-0 09 (0 30)
Total Medicare Part A Reimbursement During Six Months Before Home Health (in Thousands of Dollars)†	0 00 (0 15)	0 01** (0 02)

TABLE A.2 *(continued)*

	Any Skilled Nursing Facility Admission (P-value)	Any Other Home Health Admission (P-value)
Lagged Value Dependent Variable (During Six Months Before Home Health Admission)	0.55*** (0.00)	1.17*** (0.00)
Number of Episodes	51,314	51,314

SOURCE: Medicare Standard Analytic Files 1993 to 1995

[a] Patient has wound that requires soaking, irrigation, or debridement.

[b] Patient requires some human assistance with or does not participate in activity.

[c] If patient was not hospitalized within the two weeks before home health, days are set to zero.

[d] Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE A 3

ESTIMATED COEFFICIENTS, MEDICARE PART A REIMBURSEMENT, AND MEDICARE PART B REIMBURSEMENT DURING THE 120-DAY AT-RISK PERIOD

	Medicare Part A Reimbursement (P-value)	Medicare Part B Reimbursement (P-value)
Intercept	1823 (0.23)	761*** (0 01)
Agency Received Prospective Payment	66 (0 74)	-2 (0 97)
Age		
Younger than 65	466 (0 20)	296** 0 04)
75 to 84	-177 (0 52)	-162** (0 02)
85 or older	-457 (0 13)	-176** (0 02)
Female	-391*** (0 01)	-77* (0 09)
White	-253 (0.52)	-172 (0 12)
Original Reason for Medicare. Old Age	-7 (0 98)	-145 (0 20)
Medical Conditions		
Cancer	1675*** (0 00)	428*** (0 00)
Diabetes	1165*** (0 00)	326*** (0 00)
Cerebrovascular accident (stroke)	130 (0 74)	64 (0 32)
Decubiti stage 3 or 4	2106*** (0 00)	451*** (0 00)
Need for Complicated Wound Care[a]	-77 (0 86)	-105 (0 38)
Functional Limitations[b]		
Bathing	488** (0 03)	37 (0 69)
Eating	887*** (0.00)	165*** (0 01)
Dressing	-1 (0 99)	-106* (0 09)
Toileting	307 (0.13)	93 (0.18)

TABLE A 3 *(continued)*

	Medicare Part A Reimbursement (P-value)	Medicare Part B Reimbursement (P-value)
Transferring	193 (0 38)	-12 (0 80)
Preadmission Location Hospital	-26 (0 88)	-26 (0 60)
Had Medicare for Less than Six Months	2931** (0 03)	778*** (0 00)
Ratio of Mean Agency Visits to Mean for All Demonstration Agencies	890 (0 30)	390** (0 04)
Hospital-Based Agency	143 (0 541)	37 (0 53)
For-Profit Agency	43 (0 89)	38 (0 60)
Chain Member	-256 (0 34)	-84 (0 14)
Agency Provided Fewer than 30,000 Visits in Base Year	-192 (0 52)	19 (0 79)
Agency Located in Urban Area	447 (0 21)	40 (0 59)
Agency State		
Florida	-1380*** (0 00)	-154* (0 08)
Illinois	-1519*** (0 00)	-369*** (0 00)
Massachusetts	-587 (0 18)	-175** (0 05)
Texas	-1220*** (0 00)	-130 (0 22)
County-Level Means		
Number of nursing home beds per 100 persons over age 65	-85 (0 12)	-39*** (0 01)
Number of physicians per 10,000 persons	1 (0 97)	2 (0 52)
Hospital occupancy rate	-889 (0 51)	-238 (0 36)
Medicare reimbursement per beneficiary (in thousands of dollars)	474* (0 09)	96 (0 23)
Length of Hospital Stay During Two Weeks Before Home Health (Days)[f]	13 (0 50)	-2 (0 75)
Any Skilled Nursing Facility Stay During Two Weeks Before Home Health	-723*** (0 00)	-156* (0 08)
Total Medicare Part A Reimbursement During Six Months Before Home Health (in Thousands of Dollars)[f]	87*** (0 00)	-28*** (0 00)

TABLE A.3 *(continued)*

	Medicare Part A Reimbursement (P-value)	Medicare Part B Reimbursement (P-value)
Total Medicare Part B Reimbursement During Six Months Before Home Health	NA	0.44 (0.00)
Number of Episodes	51,314	51,314

SOURCE: Medicare Standard Analytic Files 1993 to 1995

NA = not applicable.

[a] Patient has wound that requires soaking, irrigation, or debridement.

[b] Patient requires some human assistance with or does not participate in activity.

[c] If patient was not hospitalized withing the two weeks before home health, days are set to zero.

[d] Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE A.3 *(continued)*

	Medicare Part A Reimbursement (P-value)	Medicare Part B Reimbursement (P-value)
Total Medicare Part B Reimbursement During Six Months Before Home Health	NA	0.44 (0.00)
Number of Episodes	51,314	51,314

SOURCE: Medicare Standard Analytic Files 1993 to 1995.

NA = not applicable.

[a] Patient has wound that requires soaking, irrigation, or debridement.

[b] Patient requires some human assistance with or does not participate in activity.

[c] If patient was not hospitalized withing the two weeks before home health, days are set to zero.

[d] Includes reimbursement for inpatient, skilled nursing facility, hospice, and nondemonstration home health paid under Medicare Parts A and B.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.